What If the State Superintendent Drops By?

I recently visited a student teaching site and learned that just a few days earlier the State Superintendent of Education had visited the school and toured the agriculture program - an intimidating visit to say the least. I wondered how I would have prepared for such a visit. I had been to the school about three weeks earlier and observed that the mechanics lab was somewhat cluttered and unorganized. The equipment and work areas certainly limited the amount of learning that occurred in this lab. However, as I discussed the superintendent's visit with the cooperating teacher and student teacher, I realized that a huge transformation had taken place in the lab since my last visit. Not only were the work areas organized and the clutter gone, a new aquaculture unit and germination table had been installed in a section of the mechanics lab! I was thrilled to see the changes that had taken place in such a short time. Obviously, the teacher had planned for some time for this facility improvement, but the state superintendent's visit certainly provided some incentive to get things in order. It's reassuring to see that high-level state bureaucrats can have such a positive impact at the local level!

Laboratory maintenance and improvement is a tough challenge - one for which most teachers are totally unprepared to meet. There exists a huge void in most of our preservice and inservice programs in the area of laboratory facility improvement and expansion. Teaching day after day in the same environment causes one to become blinded to the features of that environment. But, every new visitor to the agriculture program forms an immediate impression of that program, based in large part upon the nature, condition, and appearance of the lab facilities. Teachers should occasionally bring in a spouse or friend (someone who will share their honest opinions), have them tour the agriculture program, and ask for their impressions and reactions. The results may be startling, but very useful.

Laboratory facility needs are driven by curriculum and clientele. The number of students, course and program objectives, and number of teachers are the major factors in determining lab facility needs. Teachers have essentially two avenues for improving their lab facilities: improving/renovating existing facilities and/or constructing a new/expanded facility. The route to take depends upon the condition of current facilities and the extent to which current facilities have the potential to meet laboratory instructional needs of the program.

Many existing facilities could be greatly improved by cleaning, reorganizing, and redesigning work areas. If you are a secondary teacher reading this article, walk to the lab areas in your program (either physically or mentally) right now as you continue to read. Identify the pieces of equipment in your lab(s) that are inoperable or never used - time to let them go. Where are the cluttered areas in the lab? Time to clean them up.

If total facility needs cannot be accommodated in existing laboratory facilities, then an expanded or new facility request is in order. Unfortunately, school boards and administrators are not inclined to ask teachers what they need to effectively do their work (teach). Thus, teachers must make lab facility needs known to administrators and other key groups. The major steps in lab facility expansion or development are:

1. Develop a documented rationale and need for the new/expanded facility, based upon needs assessment data and program objectives. Involve the agriculture advisory council in this initial stage.

2. Determine the primary laboratory activities in which your students will engage, again based upon program and course objectives.

3. Discuss your general plans for facility expansion with parents, administrators, students, and community residents.

4. Develop the design details of the expanded facility - equipment (with specifications), tools, dimensions, floor plan, work areas, doors and windows, demonstration area, traffic lanes, storage, and similar details.

5. Secure the support of school officials and community residents. Make a formal request to the school board. Be persistent, energetic, creative, and

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Laboratory Facilities Improvement

BY GLEN M. MILLER
Dr. Miller is associate professor of agricultural education at the University of Arizona, Tucson.

Facilities in agricultural education have traditionally reflected the curriculum. As the curriculum expands, so do the demands placed upon agricultural education facilities. Both new and existing facilities must be designed to support a diversifying curriculum.

Agricultural education facilities were once geared for production agriculture. Today, facilities may need to accommodate curriculum thrusts and laboratory facilities such as:
- Technologically current science-based mechanics laboratories;
- Animal science - land/livestock laboratories;
- Landscape and turf laboratories;
- Greenhouse and horticultural production laboratories;
- Biotechnology laboratories;
- Aquaculture laboratories;
- Food science laboratories;
- Computer/agricultural CAD laboratories;
- and
- Production agriculture laboratories.

All of these laboratories have some common needs that must be satisfied. Those needs include:
- Reflecting the agricultural community served;
- Efficiently serving the curriculum;
- Facilitating effective and efficient use of teacher time;
- Providing student and teacher safety;
- Reflecting industry-current technology;
- Providing security; and
- Efficient and complimentary arrangements.

Currently in Arizona, a number of older production and horticulture facilities are being remodeled to reflect current curriculum changes. Two new facilities are under construction, and at least one more will follow within one year.

These facilities, both new and old, are reflecting changes in curriculum. Computer laboratories and biotechnology laboratories are leading the charge of new curriculum thrusts and new facility needs in Arizona. Classrooms are being designed to serve a dual purpose as both computer laboratories and as traditional classrooms. Biotechnology laboratories are being established through modification of the traditional agricultural mechanics laboratory-in-areas once used for storage, or, as in one case, a darkroom no longer used in the school. New facilities have embraced aquaculture, biotechnology, and production agriculture. Regardless of the starting point of the facility, principles of facility planning still apply and need to be considered. The alternative is a facility that fails to meet the needs of the curriculum and, worst of all, becomes a burden on teacher time. Many teachers are trapped by laboratory facilities that demand their attention 24 hours a day, seven days a week. Careful planning can reduce or eliminate this trap.

General Considerations

Some general considerations for new agricultural education facilities should include:
- Availability of land for laboratory development;
- Availability and cost of utilities installation;
- Site preparation;
- Convenience of administration, student, and custodial service;
- Sufficient space for future expansion and addition of specialized instructional programs;
- Current needs for parking, outside storage, and work areas;
- Access from roads or streets;
- Disturbances generated by noise, odor, smoke, and fumes affecting other housing or public buildings;
- Aesthetics; and
- Security.

Functional Requirements

Components of the facility, whether new or old, need to be arranged in a complementary fashion. A spatial model needs to be developed which considers the interrelationship between traffic flow and the functional nature of various components. Computer laboratories need a clean and secure environment. They must be arranged so teachers may effectively instruct and supervise students. Proper electrical power and functional work stations must be provided. Dust must be minimized. Access and distractions must be controlled.

Biotechnology laboratories must have proper

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Remodeling Laboratories for Agriscience Instruction

BY MICHAEL J. NEWTON AND DONALD M. JOHNSON
Dr. Newton (top) and Dr. Johnson (bottom) are associate professors of agricultural and horticultural education at Mississippi State University, Mississippi State.

Across the nation, many agricultural education programs are changing to more plant tissue culture, biotechnology, and applied physics programs are being added to the curriculum. These additions have produced the need for students to participate in experiential learning activities different from those traditionally engaged in by agriculture students.

The result has been a change to make the old "vocational agriculture facility" more closely resemble a chemistry, biology, or physics laboratory, at least in part. Agriscience programs require the use of microscopes, test tubes, burets, beakers, aquaria, light stations, incubators, and other equipment that probably was not considered when the facilities were constructed.

The challenge facing agriculture teachers is how to renovate existing classroom and laboratory facilities to meet the needs of a new curriculum. This article describes how five Mississippi agriculture teachers have addressed this challenge.

Tommy Waldrip
Saltillo High School

Tommy Waldrip, the agriscience teacher at Saltiff High School in Saltillo, Mississippi, teaches Agriscience, a one-hour, year-long class for 9th and 10th grade students. When he started teaching this class, two of his primary problems were a lack of storage space and lack of facilities for hands-on demonstrations and student activities.

Tommy has improved his facilities by seeking out unused science laboratory equipment from other schools in his district. He obtained a laboratory storage cabinet to store dissecting kits, soil and water test kits, microscopes, test tubes, beakers, Petri dishes, chemicals, and other supplies.

A discarded science laboratory demonstration table has been useful for student activities and teacher demonstrations. The portable table is equipped with electrical outlets, a sink, a cold-water faucet, and a ring stand. Tommy was able to obtain the table at no cost when the high school science department purchased a new one.
Ken Dorris

Millpaps Vocational Center

At Millpaps Vocational Center in Starkville, Mississippi, Ken Dorris had a facility that was already suitable for agriscience instruction. Ken's horticulture facility had a soil testing laboratory that was easily adapted for agriscience instruction. The outstanding features of this facility are the amount of work-counter space and the way each workstation is set up with a sink, gas, and air readily available. The facility has ample storage cabinets under each table and against one wall. The wall counter also includes a student cleanup station.

The agriscience laboratory is located adjacent to, but not in, the classroom—an ideal layout. If a teacher has the opportunity to build a new agriscience facility, this would serve as a good model.

Some classroom space at Northeast Lauderdale High School is devoted to two tables with growth lights for plant science activities and experiments. Students complete hydroponic projects (left) and Bottec Biology experiments using two-liter soda bottles.

Tom Clayton

Northeast Lauderdale High School

Although Tom Clayton's facility at Northeast Lauderdale is located in a trailer, he has made the most of his situation and enthusiastically incorporated agriscience into his program. In his classroom, Tom provided space for tables with grow lights, an aquarium, and soil and water testing stations. Since classroom space is limited, Tom has selected student learning activities that can be accomplished in a small area. Tom's students make extensive use of Wisconsin Fastplants and Bottec Biology activities to enhance classroom instruction.

Tom makes good use of the greenhouse provided for the horticulture program to provide agriscience students with space and materials for experimentation in agriscience. Part of the greenhouse is devoted to an aquaculture system with two 330-gallon tanks. Space is also available for student agriscience/science fair projects.

Future plans at Northeast Lauderdale include the construction of a quail hatchery and growing facility, along with an animal science center. These facilities will allow for additional experimentation by future agriscience students.

Rodney Hopper

Kossuth High School

At Kossuth High School in Kossuth, Mississippi, Rodney Hopper and his students solved their facility problems by erecting a 40' x 75' metal building. Rodney and his students disassembled the building, moved it from its original location to the school campus, and assembled it on a concrete slab poured by the students. All construction, including electrical and plumbing work, was completed by students as a class project. The cost for the facility was approximately $5000 per square foot.

In planning the new building, Rodney was mindful of the special needs of an agriscience facility. The 30' x 20' classroom is equipped with a wet lab, having a double sink, hotcold running water, above-counter electrical outlets, and ample storage and counter space. Rodney's students make use of a bank of growth lights to conduct plant growth experiments and projects.
Planning For Change

S
omeone once wrote: "Life is best under-

stood when we die and are left to fear.
"The same can be said for every-
thing this author knows about facility planning and development. Years of teaching have
improved his knowledge of the subject, but it is
all due to hindsight. He makes no claim to an
abundance of wisdom on the subject. However, he
does claim to have identified one guiding
principle: plan for change.

The author will use his own experiences at
Peoria High School in Peoria, Arizona, to illus-
trate his points. Peoria's story is typical of his-
torical changes in agricultural education across
the country. Peoria was once a small town whose
principal industry was production agri-
culture. The high school agriculture program's
focus for most of its 60 year history was pro-
duction agriculture. As the community
changed, so did the program. No longer is the
focus on production agriculture. Ten years ago
the production agriculture curriculum gave way
to a curriculum focusing on landscape design,
installation, and maintenance. In the last 10
years, the curriculum has evolved to encompass
farm management, nursery management, and
biotechnology. All curricular changes reflect
the ever changing needs of the community's
agricultural base.

Few could have predicted 25 years ago the
changes this program would experience when
the current facility which houses the agriculture
program at Peoria High School was built.
Nonetheless, speaking from hindsight, it is evi-
dent that we should have planned for change,
even if the nature of that change was unknown.
Fortunately, we are currently planning a new
facility. This takes some of the sting out of
admitting to our mistakes of old.

Location and Expansion

In Peoria's case, the agriculture department
was nestled in between two other buildings.
Consequently, as the program grew and the
necessity arose to build a greenhouse, biotech-
nology laboratory, and nursery, there was no
place to go except away from the existing agri-
cultural facility. As a result, one can log a full
mile walking from the classroom to the
nursery and back to the classroom again! Land
livestock laboratories should be big enough to
provide students with industry-current experiences, but not so big that they encroach on the
facilities and teachers to their maintenance. Additionally, it is important to remember that as your cur-
iculum evolves, so too must your facilities.

Classrooms

Classrooms for agriculture programs should be
elementary science classrooms. That is, they
should have a demonstration table in the front
of the classroom complete with a sink, water-
gas, and ample room for demonstrations and
storage space. This sort of demonstration table
leads itself to demonstrations on a variety of
subjects, including plant growth and develop-
ment, animal science, biotechnology, and agri-
cultural mechanics.

The periphery of the classroom, like any

good science classroom, should be lined with
counter tops, dry erase boards, tack boards, and
locking cabinets. Dry erase boards are recom-
ended because of their visual appeal, but also
because of the damage chalk dust does to com-
puters and printers. The counter top space is
essential for computer use and problem solving
exercises. If at all possible, counter top spaces
should be designed to enable students to sit comfort-
ablely against them with their feet underneath.
A generous number of electrical outlets should be
spaced throughout the classroom. Locking cabi-
nets are essential for storing reals, references, and
supplies.

Desks or tables, comfortable chairs, a televi-
sion with videocassette recorder, an overhead
projector, and a screen are all necessary to
complete the classroom. The writer's personal
preference has always been tables as opposed to
desks simply because they are easily moved
about for large and small group discussions, as
well as regular classroom work. Tables are also
large enough to enable students to perform
design exercises. Finally, they can be folded
and removed when the need arises. Linoleum
or tile is the best flooring choice because it
reduces noise and is easily cleaned.

Aside from the classroom, most agriculture
programs include additional facilities such as
mechanics laboratories, greenhouses, and
land livestock laboratories. In general, anyone
designing agriculture programs should give
careful consideration to the "clean room/dirty room"
concept used in technology programs. A "clean
room" is provided for learning situations that
may require sterility or at least a minimum of
dust. A "dirty room" is provided for those situa-
tions where air pollutants, oil, and grease are
likely to be present. In both cases, the
rooms should be designed with appropriate util-
ities and plenty of work space to accommodate
future additions as the agriculture program's
curriculum evolves.

The Clean Room

Many agriculture programs today are
involved in biotechnology activities. Generally,
such activities would have greater success if
they were housed in a clean environment.

The size of each room will vary depending upon
the size of the program. The lab in the author's program is approximately 650 square feet and
will accommodate no more than 10 students
working at any one time. It had to be small
because it was built inside the existing agricul-
tural mechanics laboratory. If only we had
thought about it!

The laboratory has a tile floor to facilitate
sterilization. There are ample cupboards through-
out the rooms with smooth countertops.
There is also a sink with hot and cold water.
Additional equipment will vary depending
upon the activities to be conducted in the labo-

By JOHN MULCAHY
Mr. Mulcahy is agriculture
instructor at Peoria High
School in Peoria, Arizona.

Groves shelves, such as those shown above, are critical
for maintaining tissue cultures. This one has a timer to control
day length.

A laminar flow hood or plexiglass transfer chamber is a must for any program that wishes to do a considerable amount of tissue cultures.
Laboratory Facilities Improvement for Technology Transfer

By Joe G. Harper

Dr. Harper is associate professor of agricultural education at the University of Arizona, Tucson.

THEME ARTICLE

While many things change around us, there are some fundamental principles which will continue to provide the foundations for agricultural education instructional programs. In order to remain a viable instructional program, we must hold to the fundamental ideals of providing effective instruction where students are active in the learning processes. Our instructional programs must be based upon providing active learning experiences for students. We cannot expect students to learn the latest technologies without having active involvement.

Our future teaching laboratories will not look the same as they do today, but they will be based upon the same fundamental principles. However, there is no reason for change in the way we organize facilities and provide laboratory instruction. The future facilities for laboratory instruction in agricultural education will be based upon the fundamental concepts of effective technology transfer, total quality management, and the adoption of innovative instructional strategies. We can no longer wait for others to explore innovative instructional technologies and then adopt these technologies as late adopters.

Strategies for Effective Technology Transfer

Technology transfer is based upon the concept of creating, developing, testing, implementing, and improving innovative technologies for utilization. Agricultural education instructional programs should be based upon not only the foundations of effective instruction, but also effective technology transfer.

First, technological innovations may be in the form of products or processes. In our laboratory instruction we should provide learning experiences which emphasize both. In the past we have usually placed greater emphasis upon the latest technological product innovations. While our laboratories should be equipped with the latest, most innovative equipment available, we should also provide instruction on the latest innovative processes. For example, the use of a computer to increase the efficiency of a parts inventory would be to emphasize an innovative process, not just the technology product. As we strive to improve laboratory facilities, we must place greater emphasis upon improving processes. The adopted usage of MIG welders to increase the quality and efficiency of fabrication projects is another example of where an innovative product also was utilized as an innovative process.

Another concept of technology transfer which has application to improve laboratory facilities is the utilization of systems. Agricultural education laboratories should be organized based on systems approach. Systems approaches call for holistic strategies of instruction. Often times our laboratories lack a systematic flow from one area to the next. The facilities and equipment seem disorganized and out of sync. To improve the facilities we need to give greater consideration to systematic facilities layout and improvement. Think of your facility as a flow chart. Does your laboratory instruction “flow” from one area to the next?

The future facilities for laboratory instruction in agricultural education will be based upon the fundamental concepts of effective technology transfer, total quality management, and the adoption of innovative instructional strategies.

Upgrade existing instructional materials and equipment based upon improving quality, not necessarily quantity. Do not request three additional welders of the same type you presently have. Instead, improve the quality of the facility by upgrading the existing equipment. Also, expect greater quality from students in all aspects of laboratory instruction. Greater instructional time should be devoted to improving quality, not just the amount of work.

Innovative Technologies

The greatest challenge for improving instructional laboratories will be to keep pace with the latest technological changes. The most innovative technologies are being developed at such a rapid pace that sometimes we are better off to start a new instructional laboratory than to

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Facilities for Agriscience Instruction

Although teachers have always faced the need to update and improve laboratory facilities, the change has often been framed within a familiar context of existing or known subject areas. However, rapidly changing technology and increased emphasis in science within the agriculture curriculum present a new challenge.

As a profession, agricultural education has expressed a strong belief in the need to emphasize the scientific principles underlying agricultural practice. Since agricultural education has had a long history of using experiential learning in laboratory settings, a logical step is to adapt laboratory facilities and activities to increase emphasis on science. This may mean redirecting money for resources from the traditional laboratories or areas of special interest to agriscience. Equally important will be redirecting teacher planning time to learning new concepts, principles, and laboratory activities that are associated with agriscience instruction.

Two teachers who have already made great strides toward increasing integration of science into their curriculum and developing laboratory facilities for agriculture are Jeff Lipton from Adavmsville High School in Tennessee, and Rocky Clements from Bay, Arkansas. Mr. Clements has adapted his existing facilities to serve as an agriscience laboratory for aquaculture and soil science. Mr. Lipton has constructed a new structure solely for the purpose of performing tissue culture. Each has a unique perspective on how to meet the need for an agriscience laboratory.

Rocky Clements
Bay High School, Arkansas

Bay High School, located in the heart of the Mississippi Delta rice and cotton production area, has a traditional mechanics laboratory, aquaculture and soil science laboratory, greenhouse, livestock facility, and fruit tree orchard. In this school of 300 students (grades 7-12) the current enrollment in agriculture is 70.

One challenge in implementing agriscience activities is keeping students interested. Student interest and enrollment in a course is more a function of the methods used to teach than what is taught. Methods that students in agriscience, as with any subject, require hands-on, laboratory activities in an environment conducive to learning.

As a fellow teacher stated, "When I teach welding I fill the class. When I offer a course with an emphasis on science a lot of students don't come. This may occur because welding students go to the lab and weld, while agriscience students spend less time in laboratory activities. Laboratories will have a very important function as more and more teachers begin to emphasize science concepts in their curricula.

When science principles were first integrated into the agriculture curriculum at Bay, a need for laboratory equipment and space that supported such activities was soon realized. The first question was where to locate the lab. Should existing laboratory space be reconfigured, should space in a separate building be sought, or should an attempt be made to acquire a new facility? Since a new facility was not possible, and the traditional agricultural mechanics laboratory was small, locating space outside the existing facility became the only choice.

Fortunately, a metal storage building located near the agriculture building was available. After submitting a proposal to the school administration and gaining approval, the agriculture department was given use of the vacant building. With a little ingenuity and initiative it was fairly simple and inexpensive to adapt the facility to an aquaculture and soil science laboratory. For those considering adaptation of an existing laboratory or facility, there are several questions to consider. First, what is the general condition of the existing structure? What effect will other activities in the area have on agriscience activities? In most traditional mechanics laboratories a common problem is dust and smoke. Temperatures in the mechanics laboratory may vary greatly in the cool season due to large spaces and overhead doors. Dust and other contaminants are stirred by conventional forced fans. In warm weather heat can be a bigger problem, and fans create wind gusts, stirring contaminants. The extent to which these factors are a problem depends on the presence of a exhaust or dust collection system, temperature controls and the vent or blower systems, and the type of agriscience activities to be attempt ed. Given a crude environment, a teacher might select activities less sensitive to dust and variations in temperature. Space needs vary based on the kind of agriscience laboratory activities attempted and equipment needed. Some problems may be corrected by simple modifications, such as curtains or the installation of a dust collection system, while others require major expense and effort.

The presence of electricity, water, and a drainage system is important for some agriscience activities. In an existing facility consider the following factors: voltage, unoccupied capacity of existing wiring, number and placement of outlets, hot and cold water, drain and sewage capacity, need for refrigeration, space for equipment, work bench, and floor condition or surface covering, ventilation, lighting, and the presence of windows. Knowing the kinds of laboratory activities to be conducted helps determine the extent to which each physical characteristic might be a limitation. For example, the presence of sunlight will likely cause algae to grow in an aquaculture laboratory.

While it is helpful to have a laboratory to emphasize science, much can be done without a special laboratory or expensive equipment. A typical greenhouse can provide a setting for a variety of agriscience activities. An agriculture project can be conducted with a water trough and filter made from materials purchased from a hardware store. Outdoor laboratories such as wildlife habitats, orchards, or test plots of crops can be easily adapted to emphasize scientific principles. Also, livestock facilities such as rabbit, poultry, or chinchillas are inexpensive yet excellent for teaching genetics, feed efficiency, reproduction, and other principles of animal science. The number of science activities that can be done in an existing or outdoor laboratory is limited only by one's imagination.

Jeff Lipton
Adamsville High School, Tennessee

Adamsville High School, located in the gentle rolling hills of West Tennessee, has a 50' x 70' mechanics laboratory, 30' x 50' lean-to greenhouse, 36' x 90' quarter greenhouse, and a 26' x 30' plant tissue culture laboratory. The lean to greenhouse and mechanics laboratory were built when the school was constructed in 1979. The quarter greenhouse and tissue culture laboratory were built in 1991. The school has an enrollment of 390 (grades 9-12) with about 70 in the agriculture program.

Seven years ago very few laboratory activities in agriscience, were being integrated into the curricula at Adamsville. The program had only 28 FFA members and three small classes of horticulture and agriculture. A new approach was needed. In Tennessee agriculture courses can be counted for science credits. Early in the adoption of agriscience curriculum content it was realized that the kind of laboratory activity being conducted and the desired outcome would require more elaborate facilities to be successful. Due to plans to use a portion of the existing facility for agriculture, in the near future, a new facility seemed to be the best solution, assuming a funding source could be located.

After researching possible funding sources, it was determined that the Tennessee Valley Authority might fund this kind of project. Since matching funds were necessary, the next step was to justify the need for an agriscience laboratory to educators in the local funding process. This included convincing those responsible that such a laboratory would benefit the students, school, and community.

Through a cooperative agreement, the Tennessee Valley Authority provided $40,000 and the local school board contributed $35,000. The next step was to determine appropriate physical and educational requirements for a large scale tissue culture laboratory. Adavmsville, Tennessee teacher Jeff Lipton was a refrigeri

Student at Bay High School regularly use reser for and perform routine maintenance tasks. (Photo Courtesy of Rocky Clements, Bay, Arkansas)
Laboratory Facility Improvement: From A Strong Past Comes A Stronger Future!

Once the inception of the total agricultural education program, the laboratory has played an intricate and vital part in allowing students the opportunity to develop skills necessary in the American and global food and fiber industry. Today, the laboratory continues to hold this sacred and valuable mission.

Numerous agricultural educators (authors included) often think of the word "laboratory" as it primarily relates to agricultural mechanization. By no means should the importance and relevance of agricultural mechanization skills ever be disregarded or discontinued! As technology advances, mechanical aptitude and awareness will continue to prove themselves as worthy and marketable skills. Agricultural education and the accompanying technological advances in the agriculutural sectors have deemed it necessary that agricultural education make relevant contributions. This trend is very reflective of upgrading and improving laboratory facilities. In the past two decades agriculture laboratories have grown to include greenhouses and outdoor education areas, such as demonstration plots, outdoor classrooms, and land laboratories. The 1990's have allowed the laboratory to expand and evolve (with the total program) to include areas such as aquaculture, hydroponics, tissue culture, laboratory animal science, biotechnology, food and nutrition, and urban agricultural mechanization.

These curriculum offerings are now becoming the standard by which today's agriculture programs are being measured, compared, and evaluated. Presently, there is a great demand for upgrading and improving laboratory facilities. In support of this fact, Silfetto (1992) stated, "Identification of the future role of instructional laboratories is a growing concern for agricultural educators. It can be shown that laboratory instruction is important and effective. It can also be shown that laboratory instruction has continually evolved with technology changes. The change process is an ongoing transition with considerable potential for the future." (p. 23)

The focus of this article is to promote the practice of teacher or departmental resourcefulness in improving the laboratory facilities.

Facility and Instructional Alignment

Agricultural educators should strive to provide quality and effective laboratory instruction. For this to occur, laboratories should facilitate the growth, improvements, and changes occurring now and for the future in agricultural education and the agricultural industry.

The transfer of skills and knowledge during the teaching-learning process in a laboratory setting is practiced throughout today's agricultural education. Laboratory facility improvements must be viewed with a cautious, yet forward-looking vision. Instructional growth and development should be viewed as a constant concern in any agriculture program.

An honest and accurate assessment of the needs and goals of the specific program and the abilities/skills of the teaching staff are the first step in determining laboratory improvements needed. Once evaluated, the next step is to effectively combine the programs' needs/goals and the intended outcomes for each activity with the laboratory areas available (school-based, industry-based, or community-based). These laboratory areas and resources can be identified and utilized for predetermined instructional activities or needs. The third step is to evaluate the effectiveness of the teaching-learning process and skill transfer. Lastly, necessary changes or deletions may be implemented and where deemed appropriate. These four basic steps can be used to align relevant facility improvements with instructional capability and desirable outcomes.

Regardless of the curriculum, present-day needs have mandated that students receive an opportunity to learn and practice the necessary skills to become marketable in today's workforce. The laboratory can be utilized as an effective tool to achieve the demand placed upon education by industry.

Instructional Resourcefulness in the Laboratory

As stressed by Philips and Osborne (1998, p.427) "Securing adequate facilities and up-to-date equipment can be one of the most challenging and frustrating experiences of an agriculture teacher." Frustrations aside, the laboratory continues to evolve and expand with the onset of more and more advanced technology.
Upgrading Facilities Can Be Inexpensive

The first thing that comes to mind when thinking about upgrading facilities is adding a new building, or remodeling the existing one. In most cases, building or remodeling is out of the question because of the funds available. We should think of our facilities as the place from which we offer a special service - the education of our youth. If we keep this first and foremost in mind, we will continually upgrade our facilities.

The reasons for upgrading facilities are safety, program improvement, and maximizing student achievement. The person responsible for upgrading facilities is the instructor. It is the instructor's responsibility to ensure that students have a safe place to learn the skills taught in the program. Upgrading facilities can include adding shelves in storage areas, providing better organization, and keeping clutter to a minimum. Replacing damaged or missing safety devices on laboratory equipment, cleaning up work areas, and removing foreign objects and hazardous materials is handling is becoming more important because of the products used in our programs. As programs become more flexible and open-entry/open-exit patterns become more common, we may need to consider surveillance cameras in laboratory areas.

In the area of program improvement, upgrading facilities can include:
- Creating work stations;
- Procuring components;
- Designing teaching aids;
- Making changes in the curriculum to reflect industry changes; and
- Creating audio/visual materials.

Upgrading facilities to improve student achievement can include such things as painting the classroom and laboratory walls to provide an atmosphere more conducive to learning, making the curriculum and training stations flexible enough to meet student needs, providing the latest possible components and informational materials available to teach your program, and preparing special materials for special needs students so they have the same chance to learn as everyone else.

Upgrading facilities takes time, energy, cooperation, and money. Less money creates more need for innovative ways to upgrade. By using the resources available to all instructors, upgrading facilities can be a cost-effective, much of the physical labor can be done by students, as long as the work performed reflects the curriculum and does not pose a safety hazard. The building maintenance staff can be involved in certain tasks, and the instructor can utilize summer contract time, Christmas vacation, spring break, or even free time to do some of the upgrading. Some of the upgrades can be constructed or produced by other instructional programs, if the instructor fits them. A curriculum advisory committee can be useful in getting industry support and generating ideas on how the facility can be accomplished.

By continually upgrading facilities, we as instructors can better educate the students under our charge. As a result, our students will have the chance to learn the skills we teach, our programs will improve to meet industry needs, and our students will be better prepared for industry.

By Jim Wilson
Mr. Wilson is agricultural mechanics instructor at Nevada Area Vocational Technical School in Nevada, Missouri.

What If the State (continued from page 3)

cooperative as you seek approval. Requests should be realistic, complete, and able to absorb some reductions. Develop several requests to start with the most desirable.

6. Maintain an active role as plans are drafted and construction is completed.

Use existing lab space in the best possible way and present a well-documented plan for lab facility expansion to administrators as needed. This is the bottom line. Of course, the teacher is responsible for the upkeep, appearance, and general effectiveness of all lab facilities. For many people a glance at lab facilities leaves many impressions about program activity, effectiveness and quality. You never know when the State Superintendent of Education might decide to drop by for a visit. Be ready.

Conclusion

The effectiveness of laboratory instruction need not be solely reliant upon the immediate presence of lab facilities. In most cases, laboratory facilities can be improved by implementing teacher and departmental resourcefulness to enhance and improve laboratory instruction.

The usefulness and quality of the chosen laboratory exercises and the application of their outcomes can be attributed to "laboratory facility improvements" in the highest degree. Lab facility improvements originate from the need to increase skill levels of students. In support of this fact, Josko (1992, p.23) stated that:"Progressive, science-based agriculture laboratories will be dynamic areas where exciting demonstrations, thought-provoking experiments, and student-centered activities occur. The direct result of any type of laboratory facility improvement should always be a positive increase in the teaching-learning environment for laboratory instruction. When considering available resources, one important point to remember is to not be intimidated by or constrain with the laboratory component of agricultural education. To try something new, different, or innovative with the results of any type of educational outcomes is to be on an educational threshold. If you are currently exercising resourcefulness for the improvement of your laboratory facilities to enhance instruction, you are on the right track. The everyday efforts of agricultural educators continue to serve the progressive evolution of laboratory facilities today for the technology of tomorrow.

References


This 24 x 32 greenhouse was added on to the existing agricultural education facility. A majority of the labor was provided by students certified in Agricultural Construction Classes.

THE AGRICULTURAL EDUCATION MAGAZINE

MAY, 1993

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THEME ARTICLE

Coming in June...
Theme: Agricultural Educators in Non-School Settings

Plus other articles on
- Agricultural Literacy
- Teaching Urban Students
- Supervised Agricultural Experimentation
- Food Science
- Ag Ed in Elementary Schools
program (Shepardson, 1929). That permanent legislation was never repealed, it is alive and well, and only susubred under the current legislation. So, if it really is your job to get to know your students outside of class.

Additionally, the FFA is legally an "integral" part of our program. It is a "teaching tool" (Hunsicker, undated) which is legitimate to use in class as is the overhead projector or a chalkboard. I can't imagine trying to teach without any of them. The FFA is an organization which provides you with a perfect opportunity to get into your student's lives, and to get them into your life. Few other teachers have either of these avenues into their students' experiences.

When I was in high school, my agriculture teacher used to volunteer to be the announcer at the home football games (in addition to all the countless other activities he did). Later, when I taught, I used to run the gate and serve as scorekeeper at basketball games (again, in addition to all the other activities). Why did either of us do these activities, which were not directly related to teaching agriculture? Because our students participated in them, and it was yet another way to understand something about their lives. Effective teaching is not a 40-hour per week job. It is not even a 140-hour a week job, if you confine yourself to your program. Effective teaching begins with understanding your students.

References

Lab Facilities Impm. . . .

(continued from page 4)
FUTURES and OPTIONS
Tools For Livestock Producers

Today, livestock producers are faced with many financial challenges, where business management and marketing are as important to survival as top-notch production techniques. Producers have to work smart, and agricultural educators need to have an arsenal of information to inform both students and adults. Gone are the days when teaching management practices andsize up the newest production methods constitute the entire agricultural curriculum.

Although futures markets have been around a long time, the concept of forward pricing and developing marketing plans has not been at the top of producers' interests list. Albeit, this lack of interest has been reflected in agriculture programs.

Both existing producers and future farmers/ranchers need to understand the role of futures markets to their overall operations. Futures markets do not create profits. They do, however, extend the reach for profitable market opportunities well beyond the day or week the livestock is to be marketed. In many instances, there is only a window of profitability during a livestock marketing period. Thus, a lack of understanding on how to use futures markets can result in a lost opportunity.

In order to make futures markets more accessible, option contracts on futures were developed in the early 1980s. Options provide "market insurance" that prevents loss (disasters) without shutting out increased profit opportunities. So, if the market starts moving favorably after the options insurance is in place, producers can gain the price advantage, while still having their insurance pricing intact. But the advent of options brought about a flurry of new terms like "put," "call," and "strike price," which compromised both contract users and agricultural educators.

Even though the primary function of The Chicago Mercantile Exchange (CME) is to provide a central marketplace for the forward pricing of livestock, broilers, and hams via futures and option contracts, the CME feels that part of its function is to provide "tools" to assist educators in teaching others how to use the markets properly. The ultimate challenge to agricultural educators is to learn and teach how to tie the best marketing strategy, or combinations of futures and option contracts, each piece relates the concepts in a slightly different context. The CME understands that with futures and options, it is important that a comfort factor be developed. Seeing the same information presented differently helps accomplish this goal.

For example, the Commodity Marketing Teachers Guide includes a complete lesson plan, while other informational pieces may cover only one facet of the mechanics of trading.

The following is a review of the CME's newest assortment of futures and options booklets, videos, and seminars that teachers may wish to order for their library. There are costs associated with some of the "tools" and for bulk orders. Educational rates do apply, however, as the CME is committed to supporting agricultural educators. For more information, please contact Terri Baxter or Terri Huffaker, Customer Marketing Department at the CME, 33 South Wacker Drive, Chicago, IL 60606.

BOOKLETS AND BROCHURES

The Merc at Work
A light, hearted, fun-to-read guide that will give you an overall understanding of what futures and options are, who trades them and why, and what happens on the trading floor. The 16-page guide consists of 20 pages of colorful illustrations and lively, entertaining, and informative copy. This publication is recommended for all (not just agricultural) secondary students.

A Self-Study Guide to Hedging with Livestock Futures
A 36-page business guide to livestock futures markets and how they work. Packed with helpful, down-to-earth examples and charts. This brochure helps teach the mechanics of futures and answers the most asked questions on hedging. (The self-study guide on futures and options serve as good reference material for teachers participating in the CME Commodity Marketing Program and/or those teaching adult education programs.)

A Self-Study Guide to Forward Pricing with Livestock Options
Learning to use options, like any tool, requires the same attention that most new skills require: a little time and patience to become familiar with the vocabulary and to develop a comfort level with the concepts. This 16-page booklet summarizes the steps of using options for forward pricing livestock. Specific applications of basic options pricing strategies help relate the many ways livestock options can help reduce the uncertainty of making marketing decisions.

Ten Strategies for Forward Pricing Livestock Using Futures and Options
This 25-page publication is intended for livestock producers who are comfortable with their basic knowledge of how to use livestock futures and options, but want to know more strategies and add greater flexibility to their arsenal of marketing tools. Ten Strategies covers the mechanics of strategies that are commonly used in the livestock and meat business to manage pricing opportunities on a daily or weekly basis. (This publication is more applicable to adult marketing classes.)

Risk Management for Ag Lenders
This 32-page brochure offers guidelines on policies and procedures for financing the use of livestock futures and options. Discussion includes evaluating hedge loan requests, documentation, monitoring hedge loan terms, and more. Agricultural lenders have a special interest in this brochure.

Managing Purchase Prices
A stage-two learning guide written for livestock buyers who want to learn about applying
Financing the Ag Hedger

This 12-minute video has been designed to show agricultural lenders how futures and options, as part of a marketing strategy, can help protect their customers from falling prices, while at the same time, helping safeguard their own loan portfolios.

Pit Talk

This video introduces three Exchange members and illustrates how they execute buy/sell orders in the Exchange's trading pits. They answer the most frequently asked questions the public wants to know about the actual mechanics of trading. (The video serves as an excellent introduction to futures markets for teachers to peek interest and take away the mysticism of futures trading.)

VIDEO TRAINING

NEW! Understanding the Livestock & Broiler Markets

To help all in the livestock industry better understand price management, the CME offers this intensive, introductory home-study course that covers the fundamentals affecting these markets. Separated into five modules, the 200-page workbook contains exercises, case studies, price charts, graphs, and more. And to supplement the workbook, the course includes a 4-hour videotape that leads the student through each module. (The material presented in the workbook is more suited for college level and adult education courses.)

LIVESTOCK FUTURES AND OPTIONS SEMINARS

National Seminar Series

To help both teachers and producers learn the tools of forward pricing, the CME Marketing and Education Staff travels the nation each year putting on one-day management conferences, specifically designed for each market. There are seminars for producers concerned with feed cattle, finished hogs, and calves/stockers. Seminars are also scheduled for agricultural lenders. Each program starts with the basics of futures and options and quickly moves on to real-world exercises, examples, and customized work sheets to help attendees pencil out their own uses of livestock price management strategies. (These sessions can provide educators with ideas and resource materials to use in the classroom.)

Educational Seminars for Educators

The CME sponsors an NVATA professional training workshop (annually in Chicago) for up to 30 teachers on forward pricing of livestock and poultry. The National FFA Foundation →

Planning for Change

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depend upon the curriculum emphasis of the program. Teachers should be cautioned to avoid allowing the equipment to drive the curriculum.

The curriculum should determine what equipment is purchased and how it is used.

The Dirty Room

The typical "dirty room" for any agriculture program is the mechanics laboratory. In designing this room it is important for teachers to think beyond the usual agricultural mechanics boundaries. Leave open space and plenty of electrical/compressed air outlets for future use.

The Greenhouse/Potting Shed

The size of the greenhouse will depend upon program enrollments and the program's emphasis. The author's program is a specialized horticulture program with an enrollment of approximately 200 students. Consequently, the reader won't be surprised to learn that our greenhouse is 2700 square feet. There are many good books available to assist teachers in designing and equipping greenhouse construction with local business people.

The greenhouse in the author's program is equipped with hot-dipped galvanized steel tables on one side and sand beds on the other. Running throughout the sand beds are polyethylene tubes which carry warm water. The water is heated by a sun heater and recirculated using a pump which is wired to a thermostat. Most of the greenhouse tables and beds are watered by overhead sprinklers. However, there are a few tables which have a drip system for house plants. An injection system is used to inject both acid and fertilizer into the water. The entire irrigation system is run by automatic clocks.

If at all possible, some sort of potting shed should be located near, or preferably connected to, the greenhouse.

The potting shed should be equipped with adequate storage space, bins for soil, racks for flats and pots, a sink, and table. Ours also has a rack which hangs over the propagating table. The rack holds the pruning shears, labels, markers, and rooting hormones.

Conclusion

This is where this writer's advice must end. Other teachers whose programs focus on other curricular areas such as golf course management, fisheries management, small animal care, and other areas are invited to share their thoughts on facilities design and development in future issues of The Agricultural Education Magazine. We need to hear from you. Rest assured there is another Peoria somewhere beginning the process of facility development. Let's help them get it right—the first time. And remember this: Plan for change!

Futures and Options

administrs the selection part of the program. Classroom applications are taught to those attending the two-day conference at the CME. Also, in-service training sessions are held throughout the country for agriculture instructors participating in the Commodity Marketing program and for state agriculture teacher association summer meetings.
STORIES IN PICTURES
(Photos courtesy of Glen Miller and Doug Daley, University of Arizona)

A specialized structure houses the aquaculture facility in Chino Valley, Arizona.

Planning is required for equipment arrangements to be functional and efficient.

This translucent structure filters ultraviolet light to reduce algae growth in the Chino Valley aquaculture facility.

Classrooms need to be planned with traffic flow and additions of equipment, such as computers, in mind.