THEME: Staying Current — Agricultural Mechanics
The educational reform movement and its related scholarly reports forced most Americans to rethink questions about what kind of schooling is best for our future generations. We were told in every possible way that students were not learning at rates demanded by a sophisticated, high-technology society. Now that the rude awakening is over and the dust is beginning to settle, some of the more realistic questions are being posed. Let's examine a few of these popular ones.

What should we do differently to prepare teachers for the classroom? What routes other than a farm background might be used to provide technical competence for agricultural education graduates? How do we deliver on-the-job training or inservice education to vocational agriculture teachers so they remain viable? Obviously, simple yes or no answers do not answer questions of this caliber. We must find better delivery systems. Here is a sampling of the current alternatives.

One solution being tried in a few institutions is to disband the college of education and require more coursework through subject matter departments. Another alternative is to have teachers achieve certification after they have completed a five year study. Solutions involving merit pay and improved compensation plans would have teachers become more competitive through survival of the fittest. Battles. Also, stringent entrance and exit testing programs appear to be gaining favor. No matter which alternative are put in place, vocational agriculture teachers must be masterful in directing the learning process yet technically competent.

In deciding which themes would be appropriate for 1986, several prominent vocational agriculture teachers, state supervisors, and teachers from across the U.S. were interviewed. Many major professional concerns. How to get and stay current with technical agriculture was by far one of the most popular topics. Other information-seeking approaches also pointed to technical competence as a major concern.

One of these approaches involved getting high technology integrated in agricultural education. Although microcomputers have been called the new "Ag," most agricultural educators know that computer software requires the same level of expertise with machinery as when they inherited the position. Unfortunately, when many agricultural educators start to integrate computers into their instruction programs, this technology does a very good job of amplying gaps in their subject matter knowledge base. The garbage in - garbage out principle works quite well when technical information is missing.

Several other educational incidents pointed to technical agriculture as a major professional concern. While reviewing FFA proficiency award applications, this writer noted that a student received $500 for one market hog. The appropriate signatures suggested that hogs were quite profitable that year. Fortunately, students being taught by a student teacher were not convinced that most dairy goats weigh close to 850 pounds. It is also nice that the college of agriculture student from Philadelphia learned just how many eggs a rooster can produce per day since roosters are larger than hens.

While these incidents appear alarming, they are in fact true. Most agricultural education professionals hope that the same incidents are more change occurances. I must be convinced otherwise. As one of my colleagues in the legal profession would state, "the preponderance of evidence precludes thinking to the contrary." Additional concerns must be aired when young farmer and adult education activities virtually disappear from vocational agriculture programs. The same alarms must be sounded when successful farmers and ranchers turn away from the reliable county Extension agent and seek their advice from private agriculture consultants and researchers at the Experiment Station.

Could it be that agricultural education has a serious credibility problem because it cannot deliver programs that most clientele needs? Credibility cannot be secured or maintained when solutions that are 20-30 years behind the times are given to potential and former clients who have associate and bachelor degrees. These individuals and their children will simply seek alternative delivery systems when agricultural educators prove that they are unwilling or incapable of meeting the needs of the community.

Most of the 1986 themes have a technical focus because we are moving into the subject "Ag" of technical education in agriculture. Probably life's most frustrating moments arrive when we try to teach a subject without the requisite preparation. On the contrary, few things can match the satisfaction that comes to a teacher who has that rare blend of enthusiasm, presentation skills, and subject matter competence needed to direct the learning process.

Dr. Delbert Peretti secured the authors and developed the Staying Current: Agricultural Mechanics Theme. These individuals are to be congratulated for giving their time to this professional activity.

By Blanche E. Bowen
(Db. Bowen is an Associate Professor in the Department of Agricultural Education at The Ohio State University.)
Facing the Challenge of Staying Current

By R. Dale Perrier, Theme Editor
(Dr. Perrier is an Assistant Professor in the Department of Agriculture at Stephen F. Austin State University, Nacogdoches, Texas.)

With current technologies doubling every eight years, teachers of agricultural mechanics face the unenviable task of remaining a "jack of all trades" while becoming a "master in none." The complex array of new technology and the quick turnover of current technology are responsible for the challenge of keeping up with rapid change. The major question is, "How do I keep up?" With new technology comes the challenge of staying current in agricultural mechanics. Teachers must be constantly reminded of the importance of their role in teaching agricultural mechanics. The need is great for continuous education of all teachers in agricultural mechanics.

New Skills Needed

Because teachers can make strides toward technical competence, they must first be willing to admit incompetence. Admitting that areas of weakness exist may be one of the biggest hurdles that teachers must overcome. If your colleagues are also aware of their limitations and their weaknesses, they often contain statements such as, "This is the way we have always done it," or "Back when I was..." You may be a prime candidate for a needed overhaul in technical skills. A close examination of "what is" as compared to "what should be" may reveal the areas where improvements are needed.

It is too much to expect that teachers of vocational agriculture would be able to keep up with the rapid pace of change. Teacher educators need to supply all of the continuing education needed to remain current. Professional development is an active ingredient in the continual growth of teachers in agricultural mechanics.

In This Issue

The articles developed for this issue offer viable solutions to the challenge of staying current in agricultural mechanics. I encourage the reader to examine the suggestions shown in the articles and incorporate them into the classroom plan for an active program to maintain relevant instruction in agricultural mechanics.

The FHA Ag Mechanics Contest

This contest provides a capstone experience for secondary students who are enrolled in vocational agriculture and who are majoring in agricultural mechanics. The contest was first organized in 1971 and is conducted by a national council of 115 members from education and industry. It is sponsored by the Firestone Trust Fund, a charitable trust of the Firestone Tire & Rubber Company. Together, the committee develops the activities of the contest and recommends policies to the National FHA Advisory Committee for National Contests. The rules and written description of the contest are published in "Agricultural Mechanics" of the National FHA Contest, Bulletin 4, 1985/1986/1987.

The contest includes subject matter from power and machinery, structures and electricity, construction and water conservation. All models and equipment are used as a problem solving tool to determine technical alternatives. Every student is involved in hands-on skill activities, problem solving, and a written examination drawn from the subject matter. One-half of the student's score is determined by performance skills and the remainder from written examination and problem solving activities.

The National PAS Awards

The PAS Equipment Service Technician Awards program is a special project sponsored by Deerre & Company and is in the second year of operation. The activities are designed especially for postsecondary agricultural students enrolled in an agricultural machinery service curriculum. A demonstration activity was conducted during the 1985 national PAS contest with awards program. The demonstration activity will be held in Bismarck, North Dakota on March 19, 1986 in conjunction with the National Postsecondary Agricultural Teaching Conference. This program is also organized and managed by a national council from education and industry.

The focus of this awards program is to evaluate the proficiency and recognize the accomplishments of the technician who plans to work in the agricultural machinery industry. The subject matter is taken from the systems found in agricultural machinery. The award is judged by the technician's ability to diagnose and repair components. The student is required to perform diagnosis, adjustment, identification, and a written examination. The "PAS Award Bulletin" is available from Dr. Kenneth Olcott, P.O. Box 24, Colchester, NY 12920-0024.

The Philosophy

Learning by doing is a central focus of the contest. A common goal is to provide quality instructional programs. Each meeting seeks improvements and changes which reflect both student and industry needs. The activities are designed to provide theory involving the student as an active learner. Learning becomes a pleasant and challenging experience which provides correct practice and feedback. The contest provides both transfer skills and rewards. Although winning is important, both committees are more interested in individual accomplishment. Winning is a means to the end.

These contests recognize the whole person, one that knows, does, and values quality work. When contests are correctly organized, they are a summary of sound educational practices which are stimulating for the student and the teacher. John Conrads (1985:14) reports that "...the greatest single challenge is to educate and train young men and women in order to develop the skills to work with, and maintain, today's complex systems, and then reach out to develop tomorrow's systems."

The Industry

We have excellent cooperation from agricultural industry. Firestone Tire & Rubber has been most helpful as principal sponsor of the FHA Contest. Deerre & Company has helped in a special way with both activities. Two companies did not receive several thousand dollars but the time of a substantial number of people.

Companies such as Alabama Power Company, Briggs & Stratton, Deerre & Company, General Electric, Heaton, Hobart, Makita USA, Smith-Tecson, Sperry-New Holland, and Stanley have provided tools, equipment and personnel.

They see the results of sound instruction and they want to be a part of success! The Firestone Trust Fund has established scholarships for secondary students to continue their postsecondary education. Deerre & Company will provide $7,000 for state and national student awards plus a budget for the operational expenses. The industry is ready and willing to assist quality programs that are seeking ways to stay current. But you and I must continue to search for ways to establish these partnerships.

Integrating Curriculum and Contests

The contests provide an excellent resource for curriculum renewal. There are some 90 suggested references in Bulletin No. 4 dealing with agricultural mechanics. In addition, the contests provide an excellent resource. It provides a good start toward the selection of test materials which facilitate learning. The FHA and PAS bulletin values understanding, performance and attitudes of students as important outcomes.

Both recognize problem solving as an important critical thinking skill. Subject matter is identified to structure understanding and performance activities. It can be structured so that each learning experience not only builds on the preceding one but adds depth and breadth to the understanding. When using the bulletin, current research findings and the experiences of an active advisory committee, the curriculum becomes dynamic and the program will grow and improve.

Warning!

Sometimes contests can "become the tail that wags the dog." The most experienced teacher must be familiar with both the student and the goals of the school. The activities should mirror the curriculum of the student programs and should be relevant to the job situation. When the instruction is relevant Used correctly, contest activities can be multi-dimensional to provide continuity, sequence and integration of subject matter involving students with many learning styles.

Winning at all costs is not a desirable behavior in education. We, as educators, have the absolute right to bring many of the learning principles into practice and challenge the learner toward individual achievement, then it is worth the efforts of 100% of your friends.

(The continued on page 6)
Six Tools for Staying Current in Agricultural Mechanics

A vocational agriculture teacher who plans to provide students with an effective instructional program in agricultural mechanics must stay up-to-date on the latest developments in the field. This is a tall order considering the rapid rate of advancement in all areas of agriculture, including mechanization. Fortunately, there are several effective methods busy teachers can use to keep programs current. Let us examine six of these.

Six Tools

1. **Magazines.** All agriculture departments should subscribe to a number of carefully selected general and specialized agricultural magazines. These magazines, by their very nature, carry articles on the latest developments and trends in all areas of agriculture. These articles should be used as a basis for reports, discussions, and projects related to current innovations in agricultural mechanics.

2. **Field Trips.** Carefully planned and conducted field trips are a very effective method of instruction. Actually seeing new equipment and/or processes in use on the farm or in an agricultural business gives special meaning to classroom study. Progressive farmers and agribusinesses are eager to have agriculture classes visit and observe their operations.

In today's educational climate, however, field trips may need to be scheduled for non-school hours. Although this has obvious disadvantages, it has at least one positive aspect: Only students who are genuinely interested will attend.

3. **Resources Persons.** Local agribusinesses are usually more than willing to share their resources with vocational agriculture classes. The local farm equipment dealer would undoubtedly welcome the opportunity to discuss new features of this year's equipment line with an agricultural mechanics class. Many other local agribusiness people will also share their expertise with your students. There is a two-fold gain to be made with the successful use of resource persons: The students receive current "real world" knowledge and the vocational agriculture program gets a public relations boost.

4. **Teach Principles.** Students who learn the "why's" (basic principles) of agricultural mechanics are better prepared to adapt to changes than are students who only learn the "how's" (operational procedures) involved. In agricultural mechanics we need to make it a practice to teach the why's along with the how's. Innovations rapidly make specific operations obsolete; however, basic principles never change. Let us plan our teaching with this in mind.

5. **Advisory Council.** The local advisory council can play an important role in keeping the agricultural mechanics program up-to-date. The council members are in an excellent position to point out changes which need to be made in the instructional program. Vocational agriculture teachers should make it clear that they are receptive to any constructive suggestions the advisory council has to offer. They should seriously evaluate all suggestions and implement any needed changes.

6. **In-Service Training.** The local school administrators, state supervisory staff, and teacher educators have a shared responsibility for providing inservice programs and workshops which help teachers keep up-to-date. Vocational agriculture teachers should support these efforts and let program planners know of areas which need additional emphasis. Working together, we can assure quality inservice programs.

**Summary**

Yes, staying current in agricultural mechanics will take much hard work and dedication on the part of all concerned with vocational education in agriculture. Fortunately, the agricultural education profession has never been short on these two qualities.

"Agricultural Mechanics Contests: A Part of the Problem or Part of the Solution?"

(Continued from page 5)

**Selected References**


FEBRUARY, 1980

Agricultural Mechanics/ Resources for Staying Current

When confronted with the challenge of "Staying Current" in the agricultural curriculum, the teacher of vocational agriculture may view the thought as an act in futility. Changes in the amount of scientific knowledge, the application of new technology, and the increased pace of change mean that the introduction of new products and processes continue to generate obstacles at an ever increasing rate. The adage of "running faster to stand still" illustrates the teacher's frustration of trying to stay current when adjusting programs of instruction to be in concert with the educational needs of today's agricultural industry.

Historically, teachers of vocational agriculture have always championed changes in local programs of instruction in order to prepare students for the current needs of the industry. However, it is a natural psychological reaction for all of us to resist change. The philosophical concept of "be not the first to accept the new nor the last to reject the old" is a tempering approach to curriculum planning when innovation and experimentation is required. In vocational education, curriculum changes cannot be at the whims of the imagination. Unfortunately, the ability of the teacher of vocational agriculture to conduct sophisticated and controlled research to determine curriculum content and at the same time acquire new skills to implement the changes is seldom the priority approach to staying current. Even research published through colleges and universities and the pronouncements of experts are not in themselves sufficient to bring about any change of research data. It is only when the findings and expertise are clearly relevant to the problems of the practitioner that there is little difficulty of accepting the change as a part of the teacher comfort zone only with research findings that have been obtained from primary source data and properly interpreted and packaged for local use.

**Evaluate Our Attitudes**

As teachers, we must continually evaluate our professional attitude and determine how we can remain current and establish the proper direction of thrust. Studies of the professional development of physicians and engineers identify that approximately two-thirds of these professionals reach their peak of effective performance by the end of seven years of practice. Therefore, a slow decline begins in which activities tend to become routinized and habituated - they get in a rut and become bored with their work. The other third of the professionals were able to direct their energies to new challenges and improve their professional performance.

Staying current is a challenge that can produce energies which will prevent the "seventh year sag". The philosophy of Confucius is appropriate to staying current: "If a man won't try, I will not teach him; if a man makes no effort, I will not help him. I show him one corner and if a man cannot find the other three, I'm not going to repeat myself." This identifies the point that organized inservice training workshops provided by colleges, universities, and agribusiness agencies and the update information that they provide is of no avail without the support of the profession for which it is designed to serve.

**Local Expertise Available**

Perhaps the best single source of information for staying current exists within the agribusiness industries of local and adjacent agricultural communities. The expertise which exists among selected producers, dealers, service persons, and financial agencies represents a vast storehouse of current practical knowledge when they are used as resource persons. It is imperative that these community resources be utilized and made a part of the ongoing instructional program. The expertise that local persons possess can provide direction for identifying current state-of-the-art production and business practices. The supervised occupational experience programs of students provide an ideal opportunity for the teacher to gain insight into current practices.

(Continued on page 8)

By CLINTON O. JACOB

By DONALD M. JOHNSON (Dr. Johnson is a Graduate Assistant in Agricultural Mechanization Education at Western Kentucky University in Bowling Green.)

Teachers of vocational agriculture attending a Sperry-New Holland workshop for combine operation and adjustment evaluate threshing and cleaning ability in an on-farm machinery update. Rick Henry, Buckeye AZ, New Holland dealer (second, right), provided the equipment and expertise.
Tips For Survival: A Young Teacher's Perspective

In today's world we see things change faster than at anytime in the past. School is half over and you wonder where the time has gone. Time waits for no teacher and it seems to speed up as it passes.

"Look at me, a young teacher of vocational agriculture in my first or second year of teaching and I'm already behind the times." Behind in technical and scientific knowledge. If this typifies you, then you've just taken the first step toward surviving in today's everchanging world.

Finding out just how much there is to learn about agriculture and agricultural mechanics brings us one step closer to survival. We all know there is a world of knowledge to be attained about the subject.

We must realize that we can't learn everything or we would spend all our time learning instead of teaching. We must also not become overwhelmed with the amount of information out of which we receive nothing of value. I think that one of the most difficult things a young teacher encounters is not knowing the answer to a question that a student or young farmer might ask. Don't let not knowing "the answer" throw you off balance. Instead be quick to say "I don't know, but we'll find out". Then, as soon as possible, pursue the answer to the problem or question. Involve that student or young farmer in finding that information. This will help you as well as the student. Simply being honest will never dampen your credibility.

Get Involved
Get involved with innovative farmers and agricultural business representatives. Visit these farms and agriculturists on a regular basis. We can learn from each other by observation and inquiry. This group can be used as advisors and resource people for the program. Involve this group in special demonstrations you might be conducting or that they could conduct for your class. Use their farms and businesses as field trip sites and use them and their employees as guides. I certainly am amazed at the great help these people can be. Don't be afraid to ask good questions. They will respect you for trying to learn and will probably invite you over while something special is happening.

A tour of a new or innovative farm or agribusiness will provide information for both the teacher and the students.

By Bert Gilmore
(Mr. Gilmore is a Vocational Agriculture Teacher at Sturgis High School, Sturgis, Mississippi)

Staying Current in Agricultural Mechanics — Industry's Perspective

Everyone knows that trying to tell someone how to remain current in an industry that is anything but static may be like shooting at moving targets. When conditions change, the target moves. From my perspective in the farm equipment industry, changes are dictated by the general economic conditions in agriculture. Nineteen eighty-four was a banner year for farm equipment sales. However, 1985 did show some signs of improvement with possibly the biggest boost coming in the eating of interest rates. With this factor and many others considered, the farm equipment industry can expect better times ahead. The nightmare of the past three years appears to be ending and the light at the end of the tunnel is not an incoming train.

The economic impact of the past few years with its sometimes devastating effect has no doubt brought about changes in the producer, operator, consumer, and student of agriculture machinery. The industry will be leaner, tougher, and more competitive. The dramatic cost cuts which were necessary as a result of the downturn forced the industry to be more efficient, more productive, and more resourceful. Changes initiated by research and development to meet the demands of a changing industry have also brought about greater demands on the people who use and service agricultural equipment. Larger more specialized equipment have been designed to develop hydralic service expertise. Not one can or will wait for this long a learning curve on electronics. We must move to build reliable service expertise. Our efforts should start at high schools, vocational schools, and community colleges.

Diagnostics will be a key issue. Since electronics are in- tangible in some respects, it is important that good troubleshooting methods be taught. Failed items must be quickly identified and replaced without indistinguishable replacement. Today's information shows a 20%-80% rate.

By C.E. Bass
(Mr. Bass is a Service Manager with John Deere Company of Dallas, Texas)
Staying Current in Agricultural Mechanics — Industry's Perspective

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tional opportunities. Likewise, industry has the responsibility to provide honest feedback on the performance of former students. Schools should initiate some type of follow-up program to solicit this criticism. This feedback, from both business and students who have been working for a period of time, will give vocational teachers good insight into changes and improvements in the curriculum and also insure good communication and that no gaps exist. Industry must make every reasonable effort to provide meaningful technical education. We, in the farm equipment industry support your programs. Graduates of those programs often become valued employees or dealers themselves, essential to maintaining the productivity of agriculture.

Staying Alert

Vocational institutions should be alert to changes which may affect the mission of vocational/technical education. To service today's products with yesterday's methods means a doubtful tomorrow. highly specific course content is needed and must be accompanied by highly efficient and effective teaching methods. This obviously demands that teachers keep current on the latest skills. all the time, since a teacher who is behind cannot lead the students ahead. I challenge you to remain as current as possible by keeping up with new equipment and new teaching techniques to curriculum can be adjusted as needed.

Many parents still push their children toward college because a college education supposedly opens the door to the good life. The reality of the job market is different — many college-trained people are looking for a job, while many high school graduates can't find one. Therefore, you can see the value in the tremendous service you provide to the entire agricultural industry. It is not an easy task that you have, but I can't take time to thank you enough. In fact, we probably do not communicate enough. But working together toward positive results will mutually benefit all of us.

THEME

Instructors: Can You Stay Updated In Agricultural Mechanics Technology?

By Gordon G. Jindra

(Mr. Jindra is a Mechanic Instructor in the Agri-Business Department at Manitowoc Technical Institute, North Manitowoc, Minnesota.)

All of us in the educational field ask ourselves, "How am I to stay up-to-date on the changes industry is making with computers, electrical and electronic monitoring systems, advancing complexities in hydraulics, power trains, diesels, etc. We see changes in companies such as International and Deutz-Allis that are going to require us to remember the original systems while learning new ones. I do not have a crystal ball from which to offer everyone answers, but I do have a number of suggestions that may help you stay updated.

I see the information needed to remain up to date coming from a variety of sources including the academic area, the technical area, and a combination area. First, let us take a look at the academic input. What can they offer us? Teaching techniques have to be a priority and the list includes lectures, effective demonstrations, discussions, use of field trips, and many others that could be mentioned. We have to lecture to lectures that kept us are on the edge of our seat while others were considerably less effective. What makes one interesting and the other boring.

Effective Teaching Needed

Possibly things that spark interest such as instructor enthusiasm, an up-to-date knowledge of materials, sharing personal experiences, and discussion with the class (not preaching) were missing from the instructor's presentation methods. It is not only an update of technical information but, also how to present it. Are teaching aids used properly? Twenty years ago it seemed there were virtually no teaching aids or mechanical. Today, we have an abundance, but I feel we want to be careful not to have a total video presentation. If that is what the student wanted, he/she could have purchased the video, studied it, and forgotten about "you". Teaching aids should be exactly what they imply, "Aids". We need to learn to use them to supplement our presentations and not to replace them.

The demonstration is another area where teacher trainers skilled in teaching methodologies can help us in preparing for more effective instruction. Are you showing what you want to in your demonstration, or is there a better way to present your material? Have you outlined your objectives before you start? Perhaps, instead of the instructor doing a "me-them-on" demonstration, students should be designated to present a portion of the demonstration, followed by discussion, "Learning by doing" has always been a good method of teaching in our program.

The supervision of on-the-job training is a very important area in which we need to develop expertise. We need to make sure that our students attain a well rounded experience, that they get exposure to engines and machinery, make field calls, work in the parts department, pre-delivery of new machinery, or whatever is applicable to their chosen field. I feel expertise is needed to coordinate evaluations in order to ensure that they are an asset to the
Instructors — Can You Stay Updated In Agricultural Mechanics Technology?

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The second broad heading is technical competency. Upgrading our technical skills and knowledge is a problem area we face, and probably one we face directly. As previously mentioned, the ever-changing industry puts a heavy demand on our talents to keep our teaching information updated. What can we do to remain technically competent?

One of the best methods to keep current is to attend industry service schools. I feel many companies have made excellent training courses available. Many have segmented them for various levels of experience so you can pick the level of competency you need. You want to keep in constant contact with area company representatives as to their update schools. You do not have to travel across the country for education when it might be offered next door. I recommend the one or two week "home office" or "in plant" schools that many companies offer due to the depth and quality of instruction.

Exchanging ideas very often prevents the "re-inventing of the wheel". I find that when I attend conferences, seminars, workshops, or other functions, there is always the opportunity to ask questions that may have been done during the discussion. Personally, if you are willing to share your ideas, others will add projects or materials they have developed to make a real educational experience for all.

Working in industry is another excellent means of attaining technical expertise, but it may be difficult to find the time priority to do so. You may have to be away from your teaching positions. In the Agribusiness Mechanics program at Mankato Technical Institute, we utilize customer units to offer "hands on" training for our students. As we assist students in troubleshooting and repairing tractors and machines, it gives us an opportunity to reinforce our knowledge of equipment repair. I feel the "self-study" has to be one of the means to increase your technical knowledge. If you do not understand a hydraulic system, sit down and read the service manual until you do comprehend the operation. If you are asked a question such as, "How much will a turn on the fuel adjusting screw of a Boss Diesel Injection pump affect the delivery?", answer it by setting up a demonstration (if you have a pump calibration stand or fuel rator) to see what effect each one quarter turn has on fuel delivery. Not only will you have given the students going to be interested in your system, but your ability to answer that question and the knowledge of the particular pump will be enhanced. That is only one example of hundreds of demonstrations and self-education projects you can challenge yourself. The opportunity to review technical papers may be another means to stay abreast of the forthcoming changes in industry. Keep yourself current with articles in industrial and professional periodicals.

A Joint Effort

The third general area I mentioned is a combination of technical and academic. There is a definite need for participation in conferences held by industry, our professional organizations, or other educational institutions. There are excellent settings for enhancing your knowledge. While meeting with educators or company personnel, you may ask some of them to speak to your classes or serve on your advisory council. Take the time to discuss with them your philosophy and teaching procedures and at the same time find out about new teaching aids they may be able to provide. It is difficult to network with industry representatives if they do not know your program exists.

Updating the Curriculum

The last area I want to confront is updating of curriculum. First, I feel it is our obligation to make sure that our instruction is strong in teaching our students. It is impossible for students to understand today's advanced electrical and hydraulic systems until they comprehend basic electrical principles, hydraulic principles, pumps, valves, etc.

Some of the means of updating our curriculum may include the use of advisory committees. The most practical way to find out what is needed by our graduates, suppliers, the people who are hiring them. Also, look to recommendations from past graduates for program improvement. Utilize the audio visual equipment that is being developed by industry and publishers dealing with technical education. Remember, some of your best teaching material may be the people you develop whenever and utilized as representatives of your own local. And, of course, you should never forget the students you presently have in class as an aid to you in evaluating your teaching strategies. Make sure that you introduce any programs that are new and exciting to you.

The first step in examining and hopefully improving the process of in-service in agricultural programs is to recognize the most important position involved. This is of course the classroom teacher. No one is in a better position to determine program needs than a competent teacher. This responsibility requires the teacher to constantly monitor not only subject matter, but also equipment, supplies, facilities, methods, techniques, and in fact all aspects of the program. Evaluation procedures should be utilized frequently to help identify problems in your own area. Once needs have been identified, it is the responsibility of the teacher to seek and request assistance from a qualified source.

Three Sources of Inservice

Teacher Education Department. A vital component of any program intends for students to be involved in your departments mission. This will make you more a part of the systems outlines and keep current.

Everything must start with an enthusiastic instructor, a person who is proud of his/her talents and wants to turn out top quality students. If you feel this enthusiasm, you will seek out all the avenues to keep yourself up-to-date.

THE AGRICULTURAL EDUCATION MAGAZINE
FEBRUARY, 1966

STAYING CURRENT: INSERVICE

By James Daniels

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responsibility of teacher educators, and since precedence needs determination, teacher educators play an important role in perpetuating the inservice process.

Inservice assistance should be available to teachers both individually and collectively. The following are some recommended activities to improve inservice:

a. Frequent surveys and research to help teachers identify weaknesses and needs.

b. Solicit requests for inservice assistance.

c. Provide workshops based on needs.

d. Assist with annual teacher conferences.

e. Assist in arranging industry sponsored training activities.

f. Obtain and make available related information and developments from all agricultural departments at their institution.

Teacher education should not exist to provide inservice, but should exist because of clientele requested needs. Ideal-
Tractor Service and Maintenance: Historic or Modernistic

Have you evaluated your tractor service and maintenance lessons plans recently? Does your curriculum reflect the tremendous advances in the seventies and eighties? Be honest, should you be classified as historic USA or as advanced for developing countries?

Drees and Company has not produced a gasoline tractor since 1960 in the agricultural line. Air conditioning was introduced in 1972 as a factory installed option. Electronic sensors, devices in the two wheel drive and four wheel drive trucks, has entered the combines in 1970. The function of the electronic sensors can be to tell the muscle, hydraulics, what to do and when.

Hydraulic Diagnosis

With hydraulics as a ‘muscle’ your tractor can have hydrostatic steering, hydraulic power brakes, rockshaft-depth adjustment, draft sensing cylinders, hydraulic shift transmissions, and even a comfortable seat. For these to function, the tractor has one or more hydraulic pumps.

Staying Current: Inservice
(Continued from page 15)

Commercial Agricultural Companies. Because of their vested interest in agriculture, combined with their established systems of public relations, these companies can be a prime source of inservice assistance. In most cases, their only stipulation being to give them ample lead time for making arrangements. Based on past experiences, it is clearly evident that agricultural companies are most eager to provide training sessions, demonstrations, tours of facilities, resource persons, printed materials, audio visuals, handouts and in some cases supplies and equipment. Teachers who are not currently taking full advantage of this source should make a special effort to establish a good working relationship in this area. In the interest of establishing long term programs of assistance, teachers must out of common courtesy give those companies who provide assistance proper credit and recognition. Usually, a written expression of appreciation will suffice.

Evaluation

Traditional external evaluation procedures serve adequately in assessing the value of inservice efforts. These procedures usually involved feedback in one form or another from the recipients of the training. Due to the circular dependence and perpetual nature of the inservice currentness upgrading process, internal evaluation efforts are usually minimal, and evaluation procedures. Self evaluation (preceded of course by awareness) at all levels is a must. The results should ideally be utilized for diagnostic purposes.

several control valves with a hydraulic fluid system that must be stored, cooled, cleaned, and operated at both high and low pressure. The tractor's temperature manual probably has a page of malfunctions which can occur with directions of where to go next to pinpoint the problem.

After your students recognize a problem and identify the component for testing, do you have a: 1) flow meter, 2) pressure gauges which test from 0-100 psi, 0-300 psi and 0-5000 psi and 3) all the necessary fittings to match any tractor which may come through the door? If not, you do not have the diagnostic tools necessary to do the job. Are you prepared to direct the tracing and testing of the hydraulic circuits and interpret what a drop from two to three psi or a decrease in 10-20 engine rpm means to the hydraulic system? If not, then maybe you aren’t prepared to teach hydraulic systems diagnostic. However, you can teach the necessary principles and practices for identification of problems. The post-secondary educational institutions are the ones to train the mechanics and service technicians and they will have the necessary tools and testing instruments. The biggest favor you might do for your students is train them to know when to return the tractor to the dealership.

It may lack a lot of romance, but maybe your task as a high school teacher is to preach cleanliness, changing of filters, selection of the proper fluids and lubrication and proper weight and ballast for the tractor. Thus, do a good job of what you can do best. The proper service and maintenance and tightening of those loose nuts help prevent the problems which cause work for the dealership.

Air Conditioning

Air conditioning instruction and diagnosis will increase your vocabulary and process terminology. There is ambient air duct differential, high or low side pressure, pressure vacume, refrigerant, temperature and pressure relation, condenser, evaporator, compressor, expansion valve, receiver dryer and others. Digest those terms to understand the function of the components and the troubleshooting tests can start. Continuity circuit checks are to be taken with the ohm meter at six locations, voltage checks at three locations, and the diode check in two locations. The circuits are in technicolor utilizing eight color codings on the conductors. The tractor operator forgets to appreciate the air conditioning until it quits working. It becomes a priority item rapidly.

Do you have air conditioning in your service and maintenance curriculum? Now, what can you teach at the high school level that should be left for the post-secondary educational program? What can the operator repair and which jobs go to the dealership?

Electric Sensors, Gauges, and Lights

Check the old rules on when to service the air cleaner. It read, "Every ten hours or sooner if the tractor is being operated under dirty conditions." Who defines the dirty operating condition? Today, the restricted air flow in the air filter intake system sends a light signal — now just remember to look because it is the silent type.

Tachometers can now determine the ground speed, PTO speed, and engine rpm. The dial gauge has been replaced with a digital display with touch switches. The high compression engine and the power train creating the heat. The tractor operator wants to know if the fluids, lubrication, and hydraulic are doing their job so the operator checks the heat temperature, clutch temperature, hydraulic oil temperature, and coolant gauges on the instrument panel. Pressure is also monitored in the engine and transmission oil.

The instrument panel uses four colors to highlight the voltage output from the alternator and if voltage is excessive or too low, the amber service alert light comes on. Engine water temperature is color coded from 160°F, to 240°F. The amber service alert light is activated at 230°F, to 240°F and the 240°F temperature zone is 'Red' for an emergency. The red stop engine light comes on, but in case you aren’t watching the instrument panel, the warning alarm should attract your attention. Imagine, an amber light and a horn that beeps as a service alert but a flashing red light and a steady horn means ‘stop the engine and shut down all circuits.’ Head lights, flood lights, tail lights, and the cab lights are on circuits with relay switches and circuit breakers. The diesel engine has eliminated the old ignition secondary circuit test. However, with gasoline, LP, or diesel, the alternator and starter are still needed in the lesson plan as is the cooling system. Fortunately, the VOA meter is economical to buy but how much testing are you prepared to teach? How are your electrical system lessons planned.

This lesson plan evaluation could be continued for other engine and power train components, but the point has been made. When was the last time you revised your instructional package for tractor service and maintenance? What should you be doing and what should be left for the post-secondary school system and/or as official work for the dealership? Are you repairing and overhauling tractors with high school students? Should this training be left for the post-secondary schools? Some teachers proclaim they do overhauls, but I’ve never seen a new model tractor or a four-wheel drive unit in a high school mechanics laboratory.

I feel that high school students need a basic service and maintenance program. Their teachers should stop before they’re in over their heads and/or instructional time schedule.

References
1. Service and Maintenance Manuals for Tractors.
2. Service School at Drees and Company, Minneapolis, MN.

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Transferring Agricultural Mechanics Skills

Teachers of agricultural mechanics on all levels are faced with a common problem. How do we give our students the competence in agricultural mechanics that they may use to gain employment in the highly diverse agricultural industry? How can we be sure that the skills we teach are not too narrowly focused that we graduate students who have very limited employment opportunities? What guidelines can I follow in teaching that will insure a competent agricultural mechanics graduate who has the ability to apply the knowledge and skill to a diverse number of jobs? How can I insure the transfer of learning from my program to new situations?

Transfer is not a new concept in education. A prominent member of the educational psychology community, E.L. Thordikke(1874-1949), proposed transfer as a major part of his explanation of learning. In the law of ‘Response by Analogy,’ Thordikke recognized that the persons placed in a novel situation would react with responses that they would employ for other situations with some identical elements (Lefrancois, p. 36). This would imply that in agricultural mechanics instruction, we should include as many identical elements as possible to the jobs our students will perform after graduation.

Teaching for Transfer

Judd (1908) and Hendricksen and Schroeder (1941) carried Thordikke’s theory further by experimenting with teaching principles of such a general nature that they facilitated solving many problems and learning many things that seemed very different (Gage & Berliner, 1984). This research would imply that in agricultural mechanics instruction, teaching basic principles would facilitate problem solving and transfer to new situations.

The contemporary view of transfer relies heavily on research on metacognition and on expert-novice differences. Metacognition is knowledge about one’s own cognitive system (Gage & Berliner, 1984). The person practicing metacognitive skills asks the following kinds of questions: ‘What do I know about this subject? How much time will I need to learn it? What is a good plan of attack to solve this? How can I predict the outcome of this task? How shall I revise my procedures? How can I spot an error if I commit one?’ (Gage & Berliner, page 358).

This tells us that we do certain things when we teach novices to use old, pack wheel bearings, troubleshoot an electrical system, or drive a tractor. We model for our students (give demonstrations, etc.), give them a vocabulary to use in describing their performance, and teach them how to regulate and monitor their performance. “Along with teaching them a strategy for doing things we teach them strategy for monitoring what they do. The monitoring part of instruction is metacognition” (Gage & Berliner, page 260). These metacognition skills allow experts to apply what they know to problem areas. This is the critical factor in transfer. Our students must be able to regulate and monitor their performance of agricultural mechanics skills, not just perform the task in an unthinking manner.

Conditions for Transfer

Two conditions are necessary for transfer to occur. First, students must have enough experience with the area to be sure they can learn the skills needed for transfer to occur. This implies that the basic principles needed must be taught in some depth, not just addressed in a ‘surface’ manner. Second, we must help students by modeling (demonstrating) problem-solving techniques needed. We must tell students how the skill and knowledge they are learning will transfer to new situations. If we are demonstrating measuring side clearance on a piston for a small engine, we must be sure our students understand the basic principles and emphasis that the operation is similar for any engine. We refer to this practice as teaching for procedural transfer. To achieve it, we must teach broadly applicable concepts, principles, and procedures.

Steps to Follow

What are some steps that teachers can follow to insure transfer of agricultural mechanics competencies? A) Competencies should be presented in situations as close to the agricultural industry as possible. Your students cannot gain transferable skills strictly with pencil and paper. They must experience the ‘real thing.’ Students need to have enough supervised practice to achieve a high level of competence so transfer will occur. One trial will not insure a transferable skill. B) We must provide related experiences in the classroom/laboratory environment so the student can practice transfer under our supervision. C) It is important that what we teach be accurate and detailed so the student can recognize differences as well as similarities when they attempt to transfer a skill. D) We must teach skills in progression from the simple to the complex. If students can see this relationship, they are better able to transfer it to new situations. E) When we teach a principle or arrive at a conclusion, students should be given as many examples as possible. F) It is essential that we carry the competency to the application level by utilizing the supervised occupational experience program (Gage & Berliner, 1984).

Vocational agriculture students, like all learners, are complicated. As teachers, we can be confident that our competencies will transfer to the world of agricultural mechanics occupations if we implement these basic principles of transfer in our classes.

Providing Inservice For Power Equipment

Were you able to maintain and repair power equipment (planer, joiner, table saw, etc.) during your first year as a vocational agriculture teacher? If you could, you were the exception. In most cases the first-year teacher has not developed the competencies necessary to maintain and repair power equipment. Sure, a mechanically inclined individual can read the operator’s manual and determine how to do what is necessary. But that takes a lot of initiative and one can easily procrastinate, especially with no experience.

The preservice teacher education program cannot adequately prepare the teacher with all the needed competencies. Only basic courses can be provided, leaving the responsibility to the teacher to develop the additional competencies.

(Continued on page 20)
Provisioning Inservice For Power Equipment
(Continued from page 19)

One approach to developing needed competencies and staying current in the mechanics program is to participate in workshops "hands-on" experiences to troubleshoot, maintain, and repair power equipment. Until recently in Virginia, inservice training for maintenance and repair of power equipment had been provided primarily through demonstrations. Inservice sessions were held at the teachers' conferences and representatives from industry presented the latest service information, illustrations, and provided some hands-on experiences for the teachers. The exercises involved only a small percentage of the teachers and did not cover the power equipment in the laboratory. However, for the past two years, workshops have been conducted at different school locations over a four-day period. The manner in which the workshops were planned, conducted, and evaluated may be of interest to others.

Care should be taken in planning and conducting workshops for the improvement of local facilities. Once the need has been established, either through a survey or local review of equipment and coordination among teachers, administrators, supervisors, and teacher educators. All those involved should have a planning session set priorities and delegate tasks.

The most appropriate location for the inservice workshop is in the local departments. In a school system which has 12-16 vocational teachers, the local vocational administrative officer will be in charge of organizing the group. If the local system is small, other vocational teachers from surrounding areas can be invited to attend. In cases where the workshop is held in the school system, the state supervisory staff, in conjunction with local administrators, should be in charge of organizing the group.

Planning should start at least six months prior to the anticipated date of the workshop. This allows time for industry representatives to visit the site and make recommendations on repair parts needed. In many cases, the representative will be able to identify worn bearings and other problems requiring attention. This type of planning is critical when replacement parts are needed. Being able to remove and replace parts when the expertise is available is very beneficial to the participants as well as to the local department. In the area of availability, if possible. Replacing parts after the workshop is over can be very expensive.

Arrangements have to be made with the local administrative personnel to hold the workshop in the locality. State supervisors should become involved with the administrative personnel in planning who will attend. Teachers should obtain permission to attend the workshop when it is held away from the local school.

Plans should be developed by the teachers and participants to type of credit for participating, either college credit or non-college credit. In some cases where there were enough vocational teachers in the local school, the local ad- ministration requested that an inservice credit course be offered locally and the system provided the tuition from local funding. If a rural district, use the credit for an advanced degree or for certification.

An industry representative should be present at all power equipment maintenance workshops. This person brings the latest service information and insight to the program. As one teacher wrote in the comments section of the evaluation form: "What is nice to have, when you are working on your evaluation, ‘working on an engine which has expertise was nearby was beneficial.'" The representative not only provides expertise, but is able to record the name and number of the needed parts.

Host teachers should be requested to remove sawdust and debris from the machines prior to the workshop. Some teachers object to attending a workshop which becomes a housekeeping activity. The host should also provide the following: tools, sharp blades to replace in plunger and joiner; operator's manuals, oven cleaner with lemon; steel wool (fine and medium). Varso, WD-40 or CRC lubricant, dry lubricant (paste car wax, silicone spray, powdered graphite); and rags. If possible, refreshments for a break are nice since they assist in creating a climate for learning.

The teachers should form a good idea of what to be accomplished. Once the workshop starts, the group should troubleshoot all the equipment to be used during the workshop. This is also a good time to review (possibly with a handout) the steps to follow in adjusting and maintaining each machine (references are listed at the end of the article). Safety precautions and common problems that have occurred with similar machines can be discussed at this time.

Teachers should be divided into groups of two and assigned to a specific machine with one experienced teacher working with an inexperienced teacher. The host teacher should be present at all times; it is usually an item most in need of adjustment and one that the teacher should be careful that it is adjusted correctly. If possible, there should be a mechanism to rotate to another machine. Teachers from the same school should be on separate teams.

The person in charge of conducting the workshop, usually a teacher educator, should go from group to group explaining procedures and shortcuts, verifying that correct procedures are being used, and providing positive reinforcement to the participants. The machines on which major problems are found or major adjustments have to be made, assemble the teachers and discuss the outcome.

While each machine is completed, have each group leader explain what was accomplished.

At the conclusion of the workshop, the teachers were asked to evaluate the format and content using a Likert-type scale to indicate the degree of agreement with given statements. They were also asked to provide written comments of the types of things they learned. Majority of the teachers said this type of workshop was one of the most beneficial and gave it a very high rating.

To develop the competencies necessary to maintain their equipment, all maintenance mechanics will participate in inservice workshops that provide hands-on experiences. Power equipment experiences will be provided through the state department of agriculture and equipment manufacturers. The workshops will be offered at various locations in the state. Each workshop will provide an introduction to the basic principles and maintenance of the equipment. Participants will be expected to provide the necessary parts and equipment. The workshops will be designed to provide the necessary training to the participants.

The 1986-87 survey of institutions offering assistantships and fellowships in agricultural education was conducted by the Publications Committee of the American Association of Teacher Educators in Agriculture. This survey is published to assist those in the profession who are seeking information about graduate study. Two academic institutions responded to a request for details concerning assistantships and fellowships.

Key to Understanding
The information is provided in the following order: nature of assistantships (number available); number of months available during the year; beginning month of employment; amount of work expected; monetary remuneration and other considerations, such as remission of fees, whether aid is for master's, advanced graduate program, or doctoral students; source of funds; deadline for application; and the person to be contacted. Slight variations in this pattern are due to the nature of the data provided by reporting institutions.

University of Arkansas
Research Assistantship (1); July 1; one-half time, 20 hours/week; $500-$450 per month; full tuition and fees provided; master's or doctoral; May 1; Nolan Arthur, Department Head, Department of Agricultural & Extension Education, Agriculture Building Room 301-B, University of Arkansas, Fayetteville, Arkansas 72701, telephone (501) 575-3324.

Teaching Assistantship (1); September 1; one-half time, 20 hours/week; $500-$600 per month; full tuition and fees provided; master's or doctoral; May 1; contact same as above.

Arkansas State University
Graduate Assistantships (2); 9 months plus 2 summer terms; approximately August 15; $4,250 for 9 months plus $500 for each summer term; master's; 9 months plus $3,750 for 9 months plus $400 for each summer term; master's; May 1; J.A. Hayes, P.O. Box 1060, State University, Arkansas 72467.

University of Florida
Research Assistantships (3-5); 9-12 months; resident of Florida or in-state out-of-state fees waived; master's; varies depending upon position; 1; C.E. Beeman; Department of Agricultural and Extension Education, 305 Rolls Hall, University of Florida, Gainesville, Florida 32611.

University of Idaho
Research Assistantship (1); 12 months; July 1 or later; 20 hours/week; $600 per week; out-of-state fees waived; master's or doctoral; Agriculture Experiment Station; May 1; David A. Pals, Department of Agricultural and Extension Education, Agriculture Hall, University of Idaho, Moscow, Idaho 83843, telephone (208) 885-6358.

Iowa State University
Research Assistantships (4); 9 or 12 months; July 1 or September 1; one-half time, 20 hours/week; $635 per month; fee reduction; master's or doctoral; Agricultural Experiment Station; March 1; David L. Williams, Head, Department of Agricultural Education; Iowa State University, Ames, Iowa 50011.

Fellowships (2); 12 months; September 1; $655 per month; full fees paid; master's or doctoral; March 1; USOE for Minorities and Women; contact same as above.

Kansas State University
Teaching Graduate Assistantship (1); 9 months; August 20; 10 hours/week; $600 per month; out-of-state fees waived; master's or doctoral; March 1; J.A. Boyer, Department of Agricultural Education; Kansas State University, Manhattan, Kansas 66506, telephone (913) 532-5335.

THE AGRICULTURAL EDUCATION MAGAZINE

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ASSISTANTSHIPS AND FELLOWSHIPS IN AGRICULTURAL EDUCATION

1986-87 Report...

The Cover
Course lectures should include class discussions to increase student participation and material retention. (courtesy of the Agri-Business Department of Mankato Technical Institute.)

References
Staying Current in Agricultural Mechanics

Students and instructor explain the operation and worn parts of this axial piston pump to the remainder of the class.

Hands on training allows both the student and instructor to enhance their knowledge in the mechanics industry.

Two students are participating in an air conditioning demonstration while the other class members observe procedures.

Students are setting the backlash between the ring gear and pinion on the school training model. Proper demonstration procedures are essential.

(All Photos Courtesy of the Agri-Business Department, Mankato Technical Institute, North Mankato, MN)