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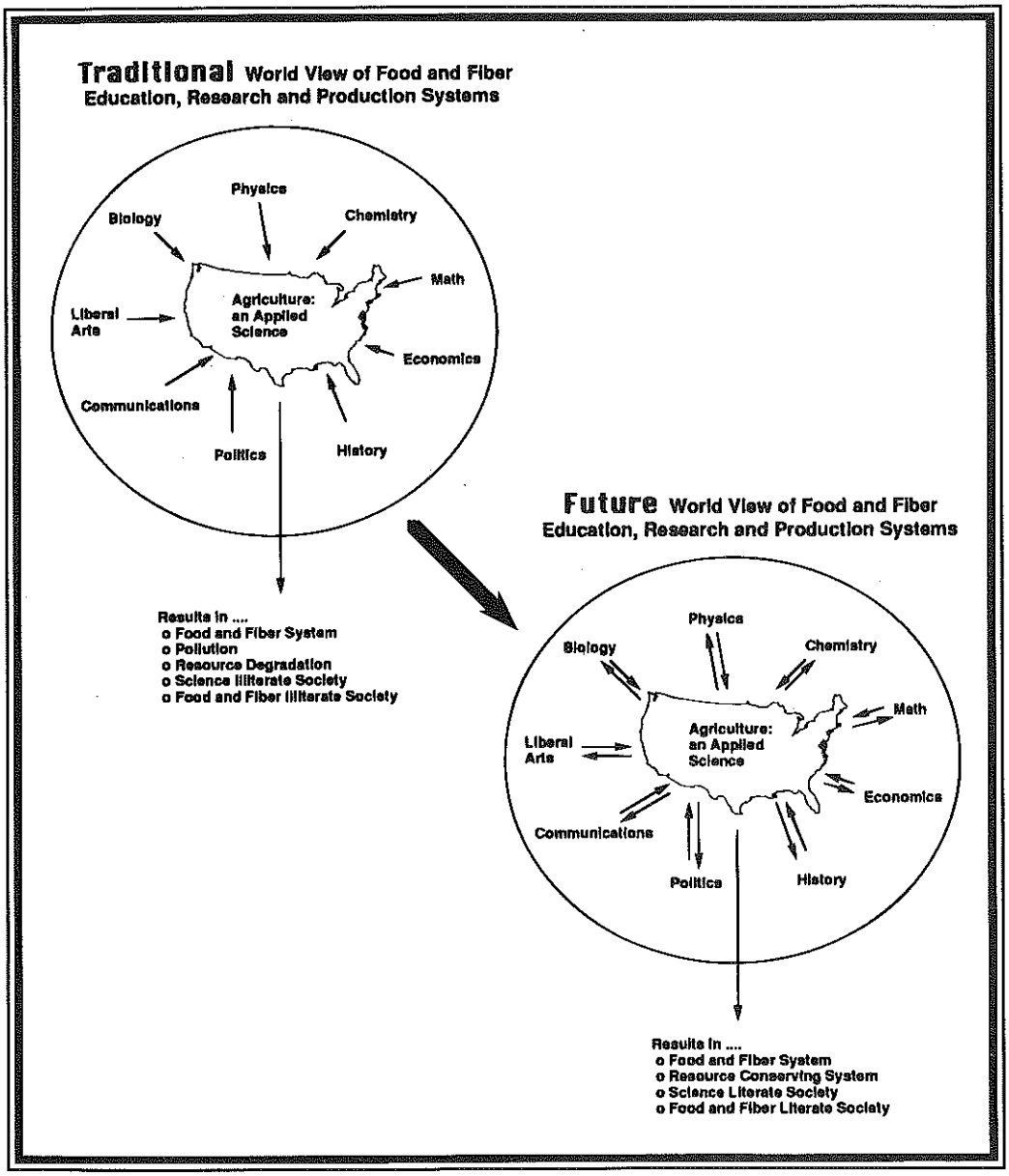

Collaboration in Agricultural Education

THE
AGRICULTURAL EDUCATION
MAGAZINE

November, 1995 Volume 68 Number 5

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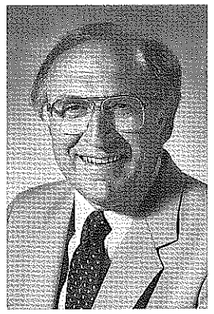
Collaboration In Agricultural Education: The Future Is Now!

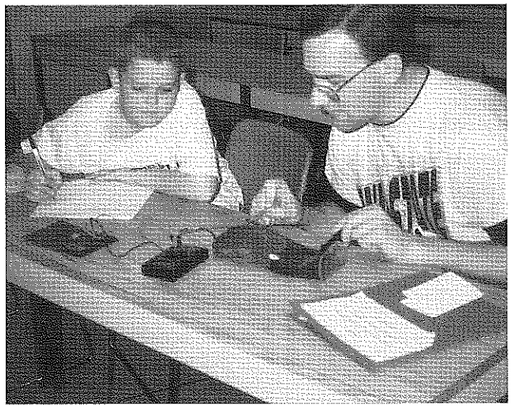


BY: ROLAND L. PETERSON

Dr. Peterson is a professor of agricultural education at the University of Minnesota, St. Paul.

The theme "Collaboration in Agricultural Education" has brought a number of thoughts to mind, reflecting a bombardment of words being used in education circles today. Words that seem to be in popular usage are: integration, partnerships, and collaboration is the word for the 1990's. Is there any difference in the meaning of these words? According to Morris (1978), the word integration refers to "making into a whole by bringing all the parts together, to unify, to join with something else, to unite, to make complete". The word partnership refers to "one who cooperates in a venture. A person associated with another or others in some activity of common interest. It implies a relationship, equal status and a formal obligation to others". The word collaboration suggests "working together, especially in a joint intellectual effort". Hoyt (1991) defined collaboration as the sharing of expertise in which parties are viewed as "consultants" to one another, neither being an "assistant" to the other. He also suggested that when educators work together with one another or with individuals from the private sector to help students, they must share responsibility, authority, and accountability. To this three-way sharing, he gave the label "collaboration."

As one reflects on these words, it seems that the future of agricultural education at the secondary, postsecondary, collegiate, extension, or adult levels, domestically or internationally, depends on how well, or if, we are willing to collaborate. It also suggests that key elements literally require that we work together, assist each other, share responsibility, share authority, and share accountability. As a profession, we need to determine if we are going the next step and truly integrate, making the profession into a whole by bringing everything together. Should we choose collaboration, indicating that we are joined together in the educational endeavor but continue to maintain distinctive roles?



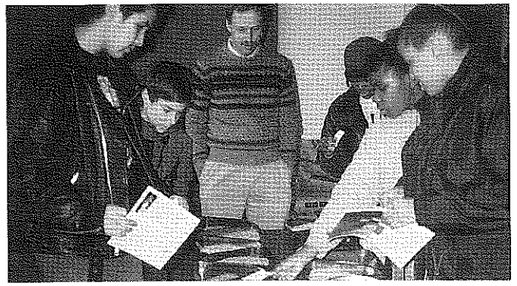
Using agriculture as a context, a University of Minnesota agricultural education student helps a Chiron Middle School student understand a science concept.

(Photo courtesy of Roland Peterson.)

In one view, it would appear that agricultural education simply should become totally immersed in the educational process. From a collaborative point of view, distinct disciplines remain, but total effort is given to produce the overall desired outcomes in students. As statements continue to pour forth that the education system has failed, it is evident that now is the time to collaborate on numerous fronts, bringing school and work together. In this situation, agricultural education provides a dynamic context to the school setting. The use of animals and plants involved in everyday life represents reality. Though animals found in a zoo may be interesting, the everyday involvement with dogs, cats, fish, horses, cattle, sheep, and pigs brings an extremely valuable context to the school setting. In addition, the vast array of common household plants, landscaping trees, and shrubs plus the common vegetable and grain crops represent reality for students. Agricultural educators need to embrace the broader context of schooling because of all the unique realities that are associated with agricultural science.

While it is not uncommon to read about collaborative and integrated programs involving English, science, mathematics, and social studies teachers who have joined together, where are the vocational teachers? One needs to ask whether the context of work, reality, and practical applications is a valuable dimension to bring to the learning experience. With so much change occurring in the school setting at all levels, now is the time to position agricultural education as a valued and full partner in collaboration with teacher colleagues, businesses, and community resources.

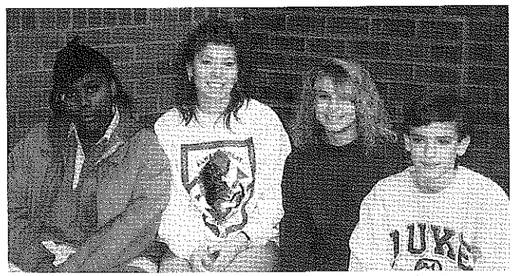
The authors of the articles in this issue →



Using grain to teach basic science concepts brings reality into an education experience for Chiron Middle School students.
(Photo courtesy of Roland Peterson.)

provide a perspective on collaboration in which various clientele groups are addressed by agricultural education programs. They bring a varied perspective to the issue of collaboration. Hopefully, readers will be made aware of the importance and urgency of the agricultural education profession, see the value of collaboration, and take action now. As curriculum reform measures and integrates academic and vocational education continues to develop, it is imperative that agricultural educators become a part of school reform measures on the local, state, national, and international levels. This urgency is not motivated on the basis of preserving our field of study, but it is needed because of the rich contribution agricultural education can make to the educational enterprise. I have no doubt in my mind that schools without an agricultural education program are not providing as rich a comprehensive and meaningful set of learning activities for students as those that have elements or all of this program interwoven into the diverse learning experiences of their students. We, in agricultural education, can provide the basis and central theme for quality learning projects that seem to frame the basis for meaningful education today.

Case in point: it has been my privilege to collaborate with Chiron Middle School located in downtown Minneapolis. This school came into existence six years ago as a result of concern by leaders in the business community who felt businesses needed to become involved in the education of students. The school concept developed around a non-graded middle school. The school features three instructional sites with close ties to the community. Students spend 12 weeks at each site during the school year, rotating through each site at some time during the year. The three sites feature science, business-law-government (social studies), and art. Mathematics, reading, and social development are taught at the home-base site. The science site was located at the University of Minnesota on the St. Paul campus and placed the program in an agricultural setting.



A mentoring experience with middle school students provides University of Minnesota agricultural education majors with opportunities in diversity and creates unique friendships. *(Photo courtesy of Roland Peterson.)*

The school was designed on the premise of using the community and mentors to provide a unique quality education. Clearly, professors and scientists were not willing to mentor and share their research work with 3-4 middle-school students every week throughout the school year and year after year. Consequently, we seized the opportunity to collaborate with the science site. As a result of this collaboration, we have developed a three-year science cycle. We focus on biological science concepts one year, environmental science another year, and physical science in the third year. The experiences are developed around the science concepts expected of Minneapolis Public School middle school students. Once the concepts are identified, educational experiences are developed for weekly laboratory experiences and weekly mentoring experiences, using agriculture as the context or application of each concept.

The laboratory experiences may occur in a regular classroom in the Vocational-Technical Education Building or at any available and appropriate laboratory in the College of Agricultural, Food, and Environmental Science. The mentoring experience involves students in agricultural education working with 2-4 middle school students. They identify a research problem that fits the theme, develop a hypothesis, and conduct a simple research investigation. The research is likely carried out in a greenhouse, a barn, or a facility on the campus. The college faculty and technical staff have been very supportive, and many have provided both space and assistance. At the close of the term, the students prepare a science fair display and a paper on the research. They prepare an oral report to a panel of judges, and their displays are presented to the school faculty and parents on a special celebration night each term.

This activity has provided an excellent preservice teaching experience for agricultural education majors as well as other students in the college. To date, 279 University of Minnesota students (mostly Agricultural Education majors)

(Continued on page 8)

Environment, Food, Agriculture, and Renewable Resources: The Missing Links in Science Education

BY: VERNON B. CARDWELL
Dr. Cardwell is a professor of agronomy in college of agricultural, food, and environmental sciences at the University of Minnesota, St. Paul.

"The terms and circumstances of human existence can be expected to change radically during the next human life span. Science, mathematics, and technology will be at the center of that change—causing it, shaping it, responding to it. Therefore, they will be essential to the education of today's children for tomorrow's world. What should the substance and character of such education be?" (AAAS, 1988).

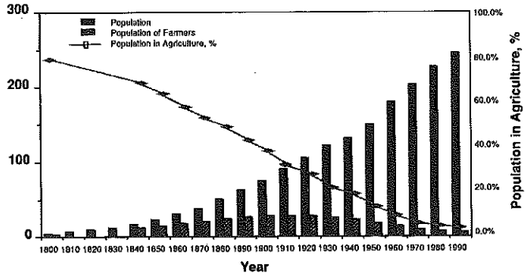
A. Mayer and J. Mayer noted in their paper, *Agriculture, the Island Empire*, "Few scientists think of agriculture as the chief, or the model science. Many, indeed, do not consider it a science at all, yet it was the first science—the mother of sciences; it remains the science which makes human life possible."

These thoughts, coupled with the soon to be released (1995) National Science Education Standards by the National Academy of Science and the earlier published "Benchmarks for Science Literacy" by AAAS, raise the questions of what is the status of education about environment, food, agriculture and renewable resources and what should be the response of the food, agriculture, and renewable resource professions and industries to education for the general populace.

The goals of Project 2061 of AAAS and the National Science Education Standards (of the National Academy of Science—National Research Council) are similar:

* Science for all students.
* Science that is inquiry-based.
* Science that is relevant.

U.S. Population and Percent of Population in Agriculture 1800-1990



This figure demonstrates the population of the United States and percent of the population that has been involved in agriculture from 1800-1990.
(Figure courtesy of Vernon B. Cardwell.)

Project 2061 gives some recognition of food, agriculture, and renewable resources science, while no mention of agriculture and only cursory coverage of food and renewable resources occurs in the National Science Education Standards (to be officially released in late 1995).

The lack of environment, food, agriculture, and renewable resources (EFAR) coverage in these national science education science standards is symptomatic of the level of EFAR coverage in current general science education.

History of Agriculture, Education, and Science

Agriculture's origins are elusive in our history, but are thought to have begun some 10,000-12,000 years ago when plants and animals were first purposefully tended for the benefit of humankind. Indigenous knowledge of the EFAR system was integral to human survival from the beginning of agriculture until the industrial revolution. During this extensive era, the majority of all cultures were engaged in food, agriculture, and renewable resource production and management. In the United States, 90% of the populace lived and worked in rural areas at the signing of the Declaration of Independence. Thomas Jefferson, a framer of the constitution, was an agriculturist as well as a political leader. His attitude toward the land and agrarian lifestyle helped shape the constitution. He was also one of America's first scientists, designing a low-draft moldboard plow.

By 1880, more United States citizens lived in cities than rural areas, but the majority of the populace were only one generation removed from their agrarian roots. (See Figure 1) The changes in agricultural production systems had changed little from the systems in place for the previous 10,000 years, but the seed of change had been sown. The attitude of "if you cannot do anything else, you can farm," was couched in the understanding that common knowledge about agriculture systems permitted most Americans to subsist in agriculture and there were abundant government lands that provided many opportunities to become EFAR managers. Today, less than 2% of the population is →

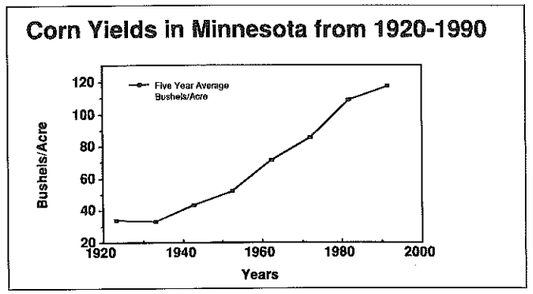


Figure 2 demonstrates the change in corn yields in Minnesota from 1920-1990. *(Photo courtesy of Vernon B. Cardwell.)*

engaged in food and fiber production and renewable resource management, and nearly 90% of the population is more than three generations removed from the land.

Strategies of Different EFAR Eras

* The pioneering and subsistence era of agriculture began when the first woman purposefully planted a seed. Land was abundant and human numbers were low. Plant and animals were domesticated, crude tools and implements were developed, and animals were harnessed to lessen the burdens of the tillers of the land. Irrigation was developed in arid land regions. In the United States, this era was marked by the westward migration of Europeans and the passage of a series of Land Grant Acts, the most notable being the Homestead Act of 1862.

Planting, tilling, and harvesting was done by hand and output per agricultural worker changed little from the beginning of agriculture until the industrial revolution. Food and fiber production was subsistence and expletive of the earth's renewable resources. Pioneering and exploitation of fragile lands continues today under pressure of an increasing world population.

* The mechanical era of agriculture began with the industrial revolution, producing new machines that allowed animal and mechanical power to substitute for human power. The output per agricultural worker increased significantly, but the productivity per unit area of land or per animal changed little from the pioneering era. In the United States, the significant events of the era were the development and adoption of steam power (late 1700's), the cotton gin (1793), the reaper (1831), the steel plow (1837), barbed wire (1874), the cream separator (1879), the vacuum milking machine (1879), and the internal combustion engine (1890). This was the era of the "Bonanza Farms", large ranches, the transcontinental railroad, and the birth of agriculture as a commercial business and its associated commodity futures markets, such as the Chicago Board of Trade (1865). These developments primarily represent mechanical engineering applications to remove production constraints, and in many ways enabled exploitation of renewable resources, while liberating millions of people to follow other pursuits.

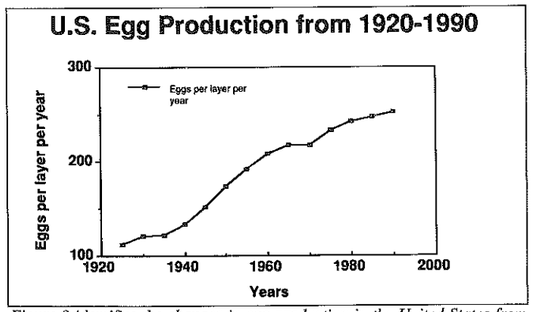


Figure 3 identifies the changes in egg production in the United States from 1920-1990. *(Photo courtesy of Vernon B. Cardwell.)*

Table 1. Estimates of the U.S. Educational System

Category	Number
Students	50 million
Teachers and support personnel	3 million
Schools	80,000
School districts	16,000
Colleges and Universities	3,300
Scientific and Professional Specialist with higher education degrees in food and agriculture	300,000
Secondary school agriculture educators	10,000
Colleges of agriculture, renewable natural resources and forestry	134

Table 1 lists the current estimates of higher education in the United States. *(Figure courtesy of Vernon B. Cardwell.)*

* The biologically enhanced era of agriculture began empirically with the selection of plants and animals and the array of varieties, genotypes, and breeds that existed before the first Europeans arrived in America and before Darwin and Mendel. The sciences of biology and chemistry began with the agricultural work of Justin von Liebig (1842) on fertilizers and mineral nutrition of plants resulting in the first U.S. commercially manufactured "guano" (1850).

Louis Pasteur's (1870s) work on silk worms, animal diseases, and beer-making lead to modern food processing and modern medicine. Gregory Mendel's (1860) work with peas established the field of genetics and modern plant and animal breeding, leading to commercial hybrid seed corn (1926). These pioneer scientists set the stage for the era of enhanced biological productivity of agriculture, sometimes referred to as the "green revolution" of the 1960s typified by the miracle rices and wheats, "flavor saver" tomato→ varieties, and the "super cow".

The impact of science on agriculture, food, and fiber productivity was and is reflected in the increased output per acre, per animal, and the development of food processing, preservation, and distribution, resulting in an ever growing number of products on grocery shelves. Historical corn yields in Figure 2 illustrate the impact of breeding, fertilizer, pest management, and cultural practices. Egg production in Figure 3 reflects the applications of breeding, nutrition, health, and management on production and feed conversion efficiency.

* The sustainable enhanced era of agriculture is, in part, a subset of the biologically enhanced era, incorporating the advent of biotechnology and precision farming, but also punctuated with issues of persistence, sustainability, and environmental impacts having its roots in "Earth Day". It is an era of conflict: Science for what purpose? Science to benefit who? Issues and the headlines of the day became environmental impacts, natural resource use, food quality, food safety, sustainability, anti-science, back-to-nature and "natural is better."

Agriculture assumed a defensive posture during this era. It became confused about doing good. It had created the cheapest and safest food any nation has ever known. It had responded to incentives of the federal government and a market economy with specialized agriculture. It had produced uniform, quality products to meet domestic and international consumers' demands. However, agriculture was increasingly criticized by other segments of society.

Agriculture also became confused about being accused of being polluters, creating biological vulnerability, raping the land, mortgaging the future, and adopting unsustainable and unhealthy practices. A loss of public support for EFAR research, loss of farmers, loss of rural communities, loss of agricultural education programs, and "right-sizing" of colleges of agriculture all became part of an uncertain and negative picture of environment, food, agriculture and renewable resources.

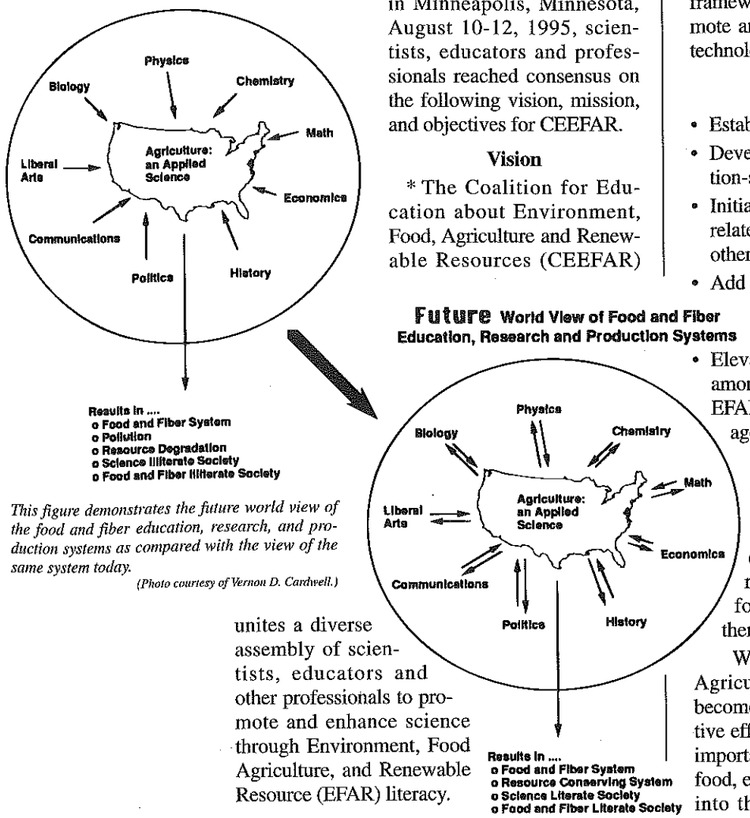
Today, production agriculture involves less than 2% of the population. Less than a fifth of the population in the United States has an understanding of the food and renewable resources systems that permit the life styles we currently enjoy. These statistics are further confounded in light of a survey of Americans by the Bayer Corporation and the National Science Foundation that found only 36% of American teachers and 32% of parents considered themselves "science literate". Given the level of environment, food, agriculture, and renewable resources which may be included in the general education for all students, one can easily surmise that Americans have become environmental, food, agricultural, and renewable resource illiterate since our food and renewable resource system is increasingly a science and technology-oriented industry.

Why has agriculture shirked its responsibility to educate America about agriculture? Where are the examples of the application of science and technology that use environment, food, agriculture, and renewable resources as the theme for communicating science? Where are the text books that address the relevance of science and technology to society? Where are the teachers of the teachers getting their information on applications of science? How can we create more interesting and relevant science learning experiences? What are the unique areas of knowledge about environment, food, agriculture, and renewable resources that every learner should know and understand to be a better-informed citizen, parent, or person? What does it mean to be an environment, food, agriculture, and renewable resource literate person? *The education community is not asking these questions!*

The gradual demunision of agriculture, food, and resource management in our formal and informal educational settings parallels the shift in society's first-hand experiences with the land (see Figure 1). Our Land Grant institutions have served agriculture well, but they have done little to educate about agriculture as a part of liberal education for all learners. The teacher educators are taught in state and private colleges and universities with little or no connection to the applied sciences of our food, agriculture, and renewable resource industries, further exacerbating the effect of separating abstract intellect and practical intelligence prevalent in our education system. Our regular classroom teachers and textbook writers have had less and less contact with the production aspects of the land and the industries providing our food and fiber needs which can be used as a context for communicating concepts.

If these questions are important, educators need our help. We must seek them out and join forces to create a win-win situation. We have much work to do, and it will require the energies, talents, and resources of the entire environment, food, agriculture, and renewable resources industry along with the commitment to a long-term program if changes are to be made in science literacy and in environment, food, agriculture, and renewable resource literacy. Table 1 reflects great need for collaboration since all agricultural educators at every level of education constitute such a small proportion of educators in this country.

CEEFAR—Coalition for Education about Environment, Food, Agriculture, and Renewable Resources—is an effort to address some of these needs. The concept of CEEFAR has been endorsed by 38 scientific societies representing over 150,000 scientists and professionals from the environment, food, agriculture, and →



This figure demonstrates the future world view of the food and fiber education, research, and production systems as compared with the view of the same system today.

(Photo courtesy of Vernon D. Cardwell.)

unites a diverse assembly of scientists, educators and other professionals to promote and enhance science through Environment, Food Agriculture, and Renewable Resource (EFAR) literacy.

Mission

* CEEFAR will serve as a forum for collaboration and facilitation of the scientific, educational, renewable resource sectors. At an organizing conference in Minneapolis, Minnesota, August 10-12, 1995, scientists, educators and professionals reached consensus on the following vision, mission, and objectives for CEEFAR.

Vision

* The Coalition for Education about Environment, Food, Agriculture and Renewable Resources (CEEFAR) and professional communities to develop, validate and support educational initiatives, standards and frameworks, programs and materials, which promote and enhance the use of EFAR science and technology for all learners.

Objectives

- Establish CEEFAR as a viable entity.
- Develop an EFAR communication & information-sharing system.
- Initiate a collaborative network among EFAR-related organizations, scientists, educators and other professionals.
- Add real-world relevance to formal and informal science education by integrating EFAR topics into educational activities.
- Elevate the importance of teaching/education among scientist and other professionals within EFAR-related societies, and public and private agencies and institutions.

Through CEEFAR and the collective efforts of all segments of the environment, food agriculture, and renewable resource professions, the missing link in life science education can be restored by giving relevance to science through environment, food, agriculture, and renewable resource themes.

We need to be EFAR educators, all of us! Agricultural educators have an opportunity to become a part of this organization. A collaborative effort from agricultural educators is critically important as another means of fitting agriculture, food, environment, and renewable resources back into the roots of science. An opportunity to restore the missing link in science education is before us. ■

Collaboration in Agricultural Education

(Continued from page 4)

and 1,067 Chiron students have been involved in a mentoring experience. This collaborative effort has provided numerous lessons for all of us. First, parents and students continually report satisfaction with their experience. Second, a collaborative effort takes enormous amounts of time and development between staff members to make the process work. Third, teachers must be willing to cooperate, to plan, to evaluate, and to totally share. We have learned that vocational educators and academic educators can be miles apart philosophically, and meaningful collaboration requires everyone being totally committed and supportive of a collaborative effort. Agricultural applications of science concepts have proven to be appropriate for this metropolitan middle school, consisting of a school population that is 55 percent white and 45 percent students of color.

As we consider the issue of collaboration in agricultural education, we need to be sure we are prepared to work together, share expertise, and share responsibility authority and accountability. It means we may have to view our philosophy and perspective of education with a somewhat different tense. Also, collaborative efforts will likely require agricultural educators to make the first move and initiate the development of a program. The future is now: agricultural educators can make a difference in the education of all students.

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Learning Partnership to the Fourth Power

BY: GEORGE H. COPA

Dr. Copa is a professor of agricultural education at the University of Minnesota, St. Paul.

What if there was opportunity to raise the creative energy and resources for an agricultural education program by a power of four? That may well be the case through four kinds of partnerships: (1) among agriculture and other subject matter areas within the school, (2) between agriculture in one school and other schools, (3) between agriculture in school and agriculture at home, and (4) between agriculture in school and agriculture in the community. Before turning to these sources of energy and resources for learning agriculture, the defining features, intensity, and motivations for learning partnerships are first explored. Following a discussion of the nature and contributions of the four potential partners, a set of principles is introduced as a basis for establishing and maintaining successful learning partnerships.

Defining Features

As summarized by Pease and Copa (1994), characteristics of partnerships include: (1) some level of cooperation; (2) shared goals, vision, or enterprise; (3) mutual respect and trust; (4) contributions of particular talents, experiences, perspectives, and resources; (5) shared power; and (6) shared accountability. These characteristics hold for all of the partnerships listed above. In the context of agricultural education, the partnership is aimed at improving the learning of agricultural competence for youth and/or adults.

Levels of Intensity

Can partnerships have different levels of association or intensity? Maurice (1984) developed a useful continuum within which to think about educational partnerships in agricultural education. His continuum contains the following levels, from lowest to highest association: (1) separation — no information or resources are shared, and each entity maintains its own sphere of authority; (2) communication — entities seek information and advice from one another, yet maintains a separate sphere of authority, (3) cooperation — entities are involved in each other's activities and resources are shared, (4) collaboration — the educational functions of both entities are considered, programs link the entities, but no major effort is made to modify either entity to accommodate mutual objectives; and (6) integrative — structures within entities are modified to accommodate mutual objectives, resources are merged, responsibility for success or failure is shared (p. 8-9). This continuum can be used to inventory and describe current partnerships and develop plans for needed changes in numbers and intensity of learning partnerships in agricultural education. To serve its needs, a particular program may have a portfolio of partnerships some at the level of communication and cooperation, while others are strategically targeted to be collaborative or integrative. At the higher levels of intensity, the partnerships will be more demanding of the program in responsiveness and contribution.

Motivations

Partnerships can also be described from a motivational perspective. Jones and Maloy (1988) characterized the various interests of being in a partnership as three categories: "obliged to", "ought to", and "want to". In their view, "obliged to" partnerships result from top-down pressures such as court orders, funding conditions, or policy requirements. Sometimes advisory committees, as a form of partnership, fall into this category. "Ought to" partnerships are motivated by feelings of some yet undefined sense of benefit. "Want to" motivations link to clearly defined gains for joint activities. Each partner, for example, the agriculture program at neighboring schools, can be categorized using these motivational categories and they may not have the same motivations. Jones and Maloy conclude that the ideal situation for partnerships is "want to—want to" motivations among the partners and that "ought to—obliged to" relationships lead to problematic relationships over time. Again, this dimension of partnerships can be used for needs assessment and planning activities in troubleshooting and strengthening partnerships in agricultural education programs.

Functions

What can be shared by partnerships toward improving agricultural education programs? →

According to a report of the National Alliance of Business (1987), partnerships can be built around sharing in the following activities: (1) partners in policy — involvement in policy development and resource allocation; (2) partners in educational improvement — involvement in planning, implementing, and assessing program improvement efforts; (3) partners in management — involvement in day-to-day coordination and operation of programs, (4) partners in professional development — involvement in education and training of program staff, (5) partners in the classroom — involvement directly in the teaching and learning process, and (6) partners in special services — involvement in specific, short term projects. This listing is proposed as being in order of decreasing impact and investment by the partners. The hierarchy of functions may be useful as a way to think about the developmental stages of learning partnerships for an agriculture program. Partnerships with a business or family may start out initially as serving a short-term, special service and then be strategically developed over time to the point of being a partner in policy formation relating to the program.

Potential Partners

Potential partners for the agricultural education program exist inside and outside the school. Some of the most important include: teachers of other subject matter areas, families of students, community-based agencies and organizations, and other schools (i.e., junior high school, other high schools, postsecondary schools).

Teachers of other subject matter areas.

Partnership efforts with other teachers are now often termed as curricular integration and are getting a lot of attention in educational circles. Partnership might involve agriculture and other vocational subjects (i.e., with the business teacher in planning a school-based enterprise, with the family life teacher in a unit on food processing) and academic subjects (i.e., with the biology teacher in an ecology unit, with the world language teacher on the global economy). Joint efforts could include coordinating lesson plans, exchanging class sessions, team teaching two classes together, and using a common learning project among two or more subjects. Benefits to the partners include increased student motivation, attention to both theory and practice, linking to real problems outside the school, and increased variety and motivation for teachers.

Families of students.

Students often identify parents and other family members as important sources of information and opportunities. Traditionally, this is not a new partner for agriculture programs, although the connection may have deteriorated in recent years. Families can become volunteers in the classroom or community-based learning sites, mentors for learning at home, sources of information on community resources, and members of advisory committees. Close partnerships with families can extend the "time on task" and "the curriculum" for learning well beyond the time and content in school.

Community-based organizations and agencies.

This group of potential partners includes business and industry, labor organizations, civic groups, training services, and religious groups. Again, these are not new partnerships for agriculture programs. Cooperative work experience programs and the community building activities of the FFA are part of the bedrock of agricultural education. Work-based learning is a growing dimension of vocational education on all fronts and is taking on new labels in the form of apprenticeship and internships. Through community-based partnerships, learning can be more practical, meaningful, and provide access to learning resources not available in the school.

Other schools.

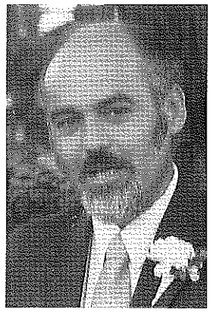
Sometimes overlooked are the partnerships that may be very useful with other schools. In business and industry, the renewed emphasis on quality has lead to close linkages with and contributions to supplier firms as a way of improving quality. For high schools, the comparable suppliers are elementary and junior high schools; for postsecondary schools, it is the high school as supplier. The quality of an agriculture program may also be improved by partnerships with other same-level institutions (e.g., one high school with others, one postsecondary institution with another). These associations can increase the extent of specialized course offerings, improve efficiency by sharing learning equipment and increasing class size, and permit teacher specialization. Last, partnerships with the next higher level of education (i.e., high school with two-year postsecondary institution, two-year postsecondary institutions with four year institution or work-based training program) can make for a smooth and unduplicated educational transition, expand learning opportunities, improve instructional efficiency, and shorten the time to program completion.

Guiding Principles

A review of research and good professional practice suggests that successful partnerships

(Continued on page 24)

Collaborating for Change — A New Experience in Kyrghyzstan: Designing an Agricultural Curriculum for Employability Rather than Employment



BY: TONY WARNER

Dr. Warner is the associate director of the centre for education in agriculture and extension at the University of Minnesota, St. Paul, and is currently on a two year assignment in Kyrghzstan.

Introduction

Kyrghyzstan is a mountainous country in former Central Soviet Asia similar in size to Minnesota with a population of 4.5 million. The Kyrghyz people are of Asian descent with a language, culture and heritage linked to that of Mongolia, and more recently, the Ottoman Empire. It is bordered in the south by China, the north and east by Kazakhstan, the west by Uzbekistan, and the southwest by Tadjikhistan. Only 7% of the land is cultivable, but there are extensive upland pastures which provide summer grazing for the sheep, cattle, yak, and horses that form the backbone of agriculture. The climate is continental with bitterly cold winters and hot dry summers.

Formal agricultural education in Kyrghyzstan is conducted at three different levels. Agricultural Vocational Schools (75) operate under the Ministry of Labor and Social Justice and provide agricultural education, combined with general education, up to grade 9 or 11 depending on the course. The Agricultural Technicums (Colleges) (7) are under the auspices of the Ministry of Agriculture and Food and provide agricultural education, again with compulsory general education, predominantly for post-grade 11 students for 2-3 years' duration. Curricula at all levels are characterized by a prevalence of theory over the practical and by very narrow specialists designed to provide the graduates and diplomats with specific employment within the state structure. There was no agricultural extension service for farmers because all farms were part of the state system and were centrally directed.

Prior to independence in 1991, all curricula for Agricultural Technicums in Kyrghyzstan originated at the specialist Educational Methodology Centre[1], Novo-Sinkovo, Dmitrov, near Moscow. The only exceptions were the curriculum for the Kyrghyz Language and for the teaching of Russian as a second language for the Kyrghyz population, which were developed within the country. Although an Agricultural Methodological Unit was established in Kyrghyzstan in February 1982, it was only permitted to make minor modifications to the centralized curricula emanating from Moscow.

No new curricula have been developed since 1991, and when a new curriculum was introduced, it was purchased from the Methodological Center near Moscow.

Against this background of a centralized curriculum development system, now situated in another country (Russia), the privatization process has meant fewer Sovkhoz (State Farms) and Kolkhoz (Collective Farms), and therefore, an outmoded series of curricula designed to produce specialists for employment in the large state farming and agricultural system that is rapidly disappearing.

The Need for Change

Since independence in 1991, the Government has made a commitment to the privatization of the Sovkhoz and Kolkhoz. Initially the privatization process was very slow, but since the middle of 1994, the process has accelerated rapidly with the result that there are fewer Sovkhoz and Kolkhoz and an increasing number of private farmers. These Sovkhoz and Kolkhoz were staffed by "specialists", e.g., tractor drivers, agronomists and para-veterinarians, who were well trained within the narrow confines of their specialties, but who had few transferable skills and were, generally, incapable (and not permitted) of undertaking the tasks of other specialists. With large groups of specialists employed on each of these farms, there was never the need to learn the tasks of other specialists and the farms were operated by large brigades (teams) of specialists with very little coordination between specialist brigades.

All training in agricultural education was designed to increase the number of specialists. Agricultural education was for employment within a given environment of the command economy and the emphasis was on producing "quantity" rather than "quality" — education was for employment **not** for employability. Within the narrow confines of the command economy, the production of specialists with a very narrow knowledge base may have been viable, although the increasing numbers of specialists employed meant that the state system was becoming far too labor intensive despite →

[1] Centralized Curriculum Development Unit - Ministry of Agriculture and Provisions of Russian Federation - Administration of Secondary Specialized Educational Institutions.

mechanization, e.g., it was normal to have one worker for 3-5 acres.

As the privatization process has accelerated, many of these specialists have found themselves as private farmers; it has become increasingly obvious that they lack a broad agricultural knowledge base, have few transferable skills, have no farm management or accountancy skills, have never been involved in decision making, and generally, are incapable of farming on their own. The implications of this are obvious with regard to present and future training in the formal agricultural education sector.

What is required, for the majority of students, is a broad-based curriculum containing those elements of agricultural practice, related to theory, that will permit them to perform the majority of tasks anticipated on the emerging, newly privatized, small scale Kyrghyz farm — typically 12-40 acres. There may still be a need for some specialists, but there is little demand for employed labor on the private farms due to their size, the large size of the Kyrghyz families, and the present economic situation.

Meeting the Changing Needs: Process

From the constraints mentioned above it became apparent that collaboration was required if agricultural education was to develop in Kyrghyzstan. The TACIS[2] program first conducted a series of national seminars during the latter half of 1994 for all stakeholders in the field of agricultural education, including farmers, farmers organizations, and representatives of the three ministries involved in the formal agricultural education sector and the institutions involved in teaching agriculture at all levels. These seminars covered the complete scenario of the needs of agriculture for the future and how formal agricultural education should respond to these needs. The seminars were extremely well-attended, and after initial reserve on the part of participants (who had never previously been asked their own opinions on such issues), they developed into active participatory exercises where the problems were given a public hearing for the first time.

The frustration of the participants was obvious as they saw the need for change but didn't know how to approach it, lacked confidence in their own ability (due to a representative of the Ministry of Education telling the participants that nobody except the Ministry staff were capable of curriculum development [although that Ministry had no staff with any agricultural background or training!]), and were aware that the financial resources were not available to undertake the development work that was necessary.

TACIS arranged to provide the financial resources and technical assistance required to start the process of curriculum reform, and the seminar's participants were charged with conducting a needs assessment for their own student population and courses. This needs assessment process was enhanced by a needs assessment being conducted at the same time for the design and establishment of an agricultural extension service, also being carried out by TACIS.

A series of "seed sowing" seminars was then conducted in each area of the country during the fall/winter of 1994 to reach as wide an audience as possible and to try to build confidence amongst the institutional staff and to get them to examine their own needs and those of their students for the future once the Sovkhoz and Kolkhoz were privatized.

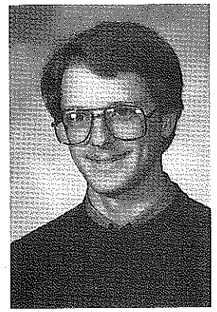
A further national seminar in February, 1995 was able to produce a complete needs assessment for the changing agricultural sector and it was agreed that new curricula should be developed to meet these needs. Collaboration had built confidence. First, the participants began to have confidence in their own ability and in colleagues in other sectors of agricultural education that they had not worked with before. Second, a rapport had been developed between the TACIS staff and the participants — enhanced by visiting and re-visiting all participants in their own institutions all over the country.

Starting in March, 1995, the directors and senior staff of the Technicums met to discuss their institutional needs for the future. It was agreed that they should scale down their "specialist" courses and introduce a series of more practically oriented courses based on the findings of the needs assessment. After this discussion, it was agreed to start work on a one year course which would offer a high proportion of practical experiences to suit the needs of those students who would return home to new family farms. This was followed by a series of six specific curriculum development seminars where the content, as dictated by the needs assessment, originated in objective terms by subject specialists from all of the Technicums. All seminars were three days in duration and funded by TACIS. These seminars, in turn, were enhanced by the technical assistance of a curriculum development specialist from the University of Reading, England, also funded through the TACIS program, who made two visits to Kyrghyzstan to assist the resident staff member to develop and fine-tune the curriculum.

The end result of this intense activity has been the development of a new curriculum for a one-year National Certificate of Agriculture to be introduced this September (1995) in all Technicums in Kyrghyzstan. The key to its success will rest with the teachers and the local methodological unit; however, it is a new curriculum for Kyrghyzstan developed by the Kyrghyz themselves, and as far as is known, it is the first curriculum developed independently by a former Soviet state. ■

[2] Technical Assistance to the Commonwealth of Independent States of the former Soviet Union. a program of the European Community.

When Two Worlds Meet



BY: BRIAN R. ALBERS

Mr. Albers is an agribusiness instructor at Montevideo Senior High School in Montevideo, MN.

Amazing things happen when two worlds meet. For students at Montevideo Senior High School in Montevideo, Minnesota, two worlds met to create an innovative course in applied biology when the agribusiness and biology departments came together to form a shared course and a shared vision.

The two departments taught traditional topics in biological and environmental arenas and were doing quite well. However, the school principal discovered funds were available for teachers interested in collaborative work, referred to as "Tech-Prep". He encouraged us to develop a course that could use the strengths from each department. After some preliminary discussion, we put on our thinking caps and went to work.

Mutual interest in the outdoors and the environment led us to begin developing a course we now know as Applied Biology and the Environment. Richard (Butch) Halterman of the biology department and I quickly learned of each other's strengths, and began developing the course around them. Mr. Halterman was to provide the scientific processes involved in a given class topic and my role was to demonstrate the practical use for the information the students had learned. It was our intent that students learn only what they could put to use. With that premise in mind, we went to work.

Developing the new course went rather smoothly because both instructors had clear ideas of how the new course should be framed. We found we could work together and respect each other's point-of-view. A vision of the intended combined effort was necessary in order for early success to occur. We spent hours discussing possible topics, possible limitations, and how we could put the instruction to practical use outdoors or in a laboratory setting. Seven units were developed, key topic areas identified, and activities planned. From that point, we began to build lessons and try them out in the new course.

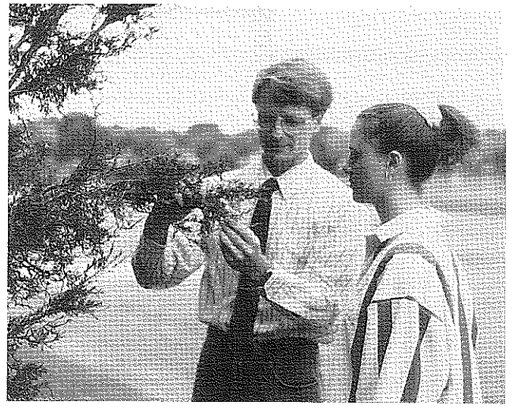
In the first semester, we were assigned over 40 students in a classroom designed for 25. We could have divided into two groups with Mr. Halterman teaching science principles and I teaching the application. However, we chose to stay together where the real advantage of team teaching revealed itself. As I would lecture, Mr. Halterman might jump in to show how something I was demonstrating had a scientific basis. Later, as he covered a scientific phenomenon, I could give an example of how it occurs in nature. Had we been in separate rooms, that type of interaction would not have occurred. By modeling teaching in this manner, students also witnessed how agriculture and science truly are a blend of disciplines.

Most topics covered in the course incorporated scientific principles and practical applications of science. For example, in the forestry and wood products unit, Mr. Halterman discussed the physiological structure and function of trees. Students learned in a traditional classroom setting how trees take raw materials and produce energy and waste products. They also learned how food is moved throughout the tree. We then took them to our outdoor learning classroom on the edge of town where I demonstrated grafting trees using the xylem and phloem knowledge they had received in the classroom. This was followed by having students make grafts on young trees, therefore the knowledge they learned was put to a real test. This philosophy of using information in real world contexts was continued throughout the semester class.

Other topic areas covered in the course included waste management, water quality and management, soils management, wildlife management, and alternative energy. While the course was or one semester, it could have easily been adapted to last a full year. We made extensive use of outside experts to support ideas we were teaching. We used local soil and water conservation personnel, DNR agents, wildlife interest groups, county extension educators, and wind power experts. With each outside resource person we brought to the class, students were able to witness the broad array of agriculture career areas available. This was incidental to our purpose, but nevertheless, it became an added benefit to the students and the course.

Students soon appreciated what was being taught in class. Before they could say "Why do we have to learn this?", we would explain how the classroom knowledge was going to be put to use on a project that concluded every unit.

Students preferred projects as a final assessment of their knowledge instead of the →



Mr. Brian Albers is shown working with one of his students from Montevideo High School, Montevideo, MN.

(Photo courtesy of Brian R. Albers.)

traditional test. We felt that a test could show their recall ability, but did not truly illustrate how well they could apply basic knowledge to situations. Therefore, we found it better to have students prepare land use summaries, perform water quality assessments, test soil, and write recommendations to the landowner. Agriculture students in the class quickly adapted to this performance style of testing while the traditional science students often found it more difficult to apply textbook knowledge to real life situations. However, by the end of the semester, there was no observable difference in all the students' ability to complete the required tasks.

One great benefit to agriculture through this affiliation was the increased exposure of traditional college-bound students to the style and quality of instruction available in agricultural education. They observed and practiced "hands-on learning", "performance assessment", and "group interaction" on a scale not experienced before. The new alliances formed across typical class boundaries were beneficial for all students. This exposure has even led non-traditional students to take courses from our agricultural education department.

The new course is not without its drawbacks. It is essential when engaged in collaborative teaching that one establish a good open working relationship with your partner. Differences of opinion must be dealt with as well as differing knowledge levels from topic to topic. You must discuss from the beginning how each department's budget will be affected, sharing equipment and facilities between departments, and the division of classroom management responsibilities. We worked these things out by volunteering for things such as attendance, grade reporting, and arranging transportation. We also realized that in order to offer a new class, something else in the course offerings would have to give. In essence, you are eliminating an agriculture course from your program in order to make room for a new agriscience course. In many schools, this retooling will likely provide a "shot-in-the-arm" for registration. Consequently, this loss of a course should not necessarily be looked upon as a disadvantage.

The course was graded using a checklist system for each unit project as well as regular quiz scores. Both instructors have been trained in the new graduation rule being implemented in Minnesota. As a result, we chose to develop our scoring system in line with the state agency thinking. We found that once we adjusted to the scoring system, it was easier to score projects than it had been in our old grading system since checklist scoring is more objective and less prone to personal bias or viewpoints. The students enjoyed the checklist scoring system because they were given the exact scoring tool that will be used on their final project from the onset. Sometimes we handed-out the score sheet at the beginning of a unit so that students could see how the classroom or outdoor lab sessions relate to the final project. We felt this made students more attentive to information shared in class, removed ambiguity in our notes, and forced us to remain on task with the students. Less time wasted in scoring allowed for more time performing "hands-on" tasks.

The course has garnered approval as a science course from the administration, and we are hopeful that post-secondary institutions will also recognize it as a science course. This course should not be viewed as one in which good grades are easily achieved. Student testimonials have reassured us that we are offering a challenging course that provides students one more dimension on how they can learn science.

From my perspective as a teacher of agricultural education, this collaboration and team teaching in applied biology was successful for several reasons. First, I had an excellent co-teacher with whom to work, and a good working relationship is essential. Second, our equipment needs for the course were low—we utilized all that we already had in our possession. Both instructors enjoyed getting out of the classroom to teach principles. Had one of us not cooperated, it would have been a long semester. Flexibility in both teachers allowed some units to run over the planned length while others could be shortened without causing a conflict. You need to give and take like anything else when working with a co-teacher.

The success of this class has us talking about

(Continued on page 17)

Leadership Development Workshop: A Collaborative Event Conducted by FFA Officers

BY: VERNON D. LUFT AND THOMAS GEORGE

Dr. Luft is an occupational teacher educator in the college of education at the University of Nevada, Reno. Mr. George is an agriculture instructor at Albert Lowry High School in Winnemucca, NV.

Collaboration is a trend and buzz word in education today. As educators, we most often think of collaboration between education and business, between universities and local school districts, between colleagues (teachers or professors), between occupational and academic education, or between teachers and students. This story is about collaboration between student groups.

A primary goal of the FFA is to develop leadership skills in its members (National FFA Organization, 1991). This is accomplished through learning about leadership and participating in leadership activities. Agricultural educators recognize that to develop leadership, we need to practice skills by participating in a variety of activities. We also recognize that if we plan and teach a skill to others, our own skills are improved. Dormody and Seevers (1994) indicated that FFA members in a three-state area are actually implementing leadership activities more often than planning activities for leadership development. They recommended that to increase leadership life skills development, members should participate in planning and evaluating activities. The FFA chapter members of Lowry High School in Winnemucca, Nevada have recognized for quite some time a definite lack of leadership skills in the members of various clubs and organizations in their school. In particular, they noted that students elected to student body offices were lacking the leadership skills necessary to perform their duties effectively. As a result, students struggled with their assigned leadership position responsibilities.

The Winnemucca FFA Chapter officer team decided to do something about the problem by sharing some of the leadership training they had received with other student groups in the school. All chapter officers had attended the State FFA Leadership Camp at least once, and all had attended one or more Made For Excellence Conferences, and all had attended the State FFA Convention. Each of the officers has competed in some type of leadership contest that requires interviewing or speaking to a group, such as marketing, creed speaking, star Greenhand, or prepared or extemporaneous speaking. These events provided an excellent base from which to draw hands-on leadership development activities to share with others.

The officers chose to collaborate with other student groups by conducting an all school leadership workshop for student body, class, club, and organization officers. The chapter officers knew they could rely on the leadership training they received in FFA to organize, conduct, and evaluate a meaningful workshop.

The first step in planning the workshop was to acquire approval from the school administration, and to obtain permission for school release time for the FFA officers and other students. The principal was very receptive to the idea and offered his full support. He not only granted the time requested, but offered to provide school transportation for all students to a downtown site for the workshop. An off school site was chosen to allow more freedom for group activities, particularly those that create noise, and to provide an atmosphere different from the routine school setting.

A three-hour block of time was allocated for the workshop. In planning the activities, the officers divided the time into fifteen-minute segments in an attempt to keep things moving, participants interested, and to use the time wisely. Each time segment was filled with an activity that each officer wanted to conduct. In some cases, two officers worked together as a team to conduct their activity. When not conducting an activity, officers served as assistants to their peers.

The leadership workshop program consisted of one activity to build team work where students were joined in a "human knot" and had to untie themselves through a team effort. A personal awareness activity consisted of students discussing desired personal traits. Another activity consisted of drawing a ship and discussing how certain parts of the ship may describe an individual's characteristics. Discussing officer duties and responsibilities, familiarizing participants with common parliamentary procedure practices, and discussions revolving around qualities of leaders were topics of other workshop activities.

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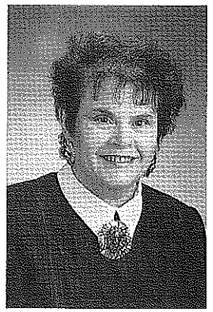
Looking For New Opportunities For Collaboration



BY: JACQUELYN DEEDS AND TERRY RECTOR

Ms. Deeds is an associate professor of agricultural and extension education at Mississippi State University. Mr. Rector is agricultural extension agent, Mississippi Cooperative Extension Service in Warren County, Vicksburg, Mississippi.

As agricultural educators, we need to look beyond our usual partners when looking for new opportunities for collaboration. We may also be able to tie in other issues of importance to agricultural education such as agricultural literacy.

Consider if you will, the opportunity to provide agricultural experiences for older adults. Elderhostel participation may be the collaborative effort that will fit your agricultural education program.

What Is Elderhostel?

Elderhostel is an educational program for older adults who are looking for something new. It is for individuals who want to continue expanding their horizons and developing new interests and enthusiasm. First begun in Massachusetts in 1975 with five programs and 200 participants, Elderhostel has grown to include over 2,000 host institutions in all 50 states and in 10 Canadian provinces. In 1994, approximately 250,000 individuals participated in Elderhostel (Elderhostel, 1994).

Elderhostel courses are usually one-week residential, educational programs with 30-40 tuition-paying participants. The programs take place at a variety of sites including college campuses, conference centers, and environmental education centers. Tours and lectures and/or hands-on types of activities form the basis of the educational experience.

Agricultural educators could develop their own separate Elderhostel program or take the opportunity to collaborate with programs already existing in their area. The Cooperative Extension Service in Warren County Mississippi chose collaboration, and county agent Terry Rector shares his Elderhostel experience.

One Agricultural Educator's View of Elderhostel

"No ma'am, we don't pick cotton by hand anymore."

"Catfish are fed a high protein grain ration similar to that fed to poultry."

So go the answers to question typically asked by Elderhostel audiences at Vicksburg, Mississippi.

As county agent in Warren County, I have been speaking at the Elderhostel program hosted in Vicksburg by Mississippi College for four years. Most years, we will have two or three groups in the spring and two in the fall. My presentation is titled "Cotton, Catfish, and Chickens — Mississippi Agriculture Today."

In Vicksburg, Elderhostel participants are treated to a lot of history — the 42 day Siege of Vicksburg during the Civil War, the local plantation of Jefferson Davis, ante-bellum homes, the Vicksburg National Military Park. Then there is the river — the Mississippi — and all its blessings and problems.

My job at Elderhostel is to tie together the river and its rich alluvial soils, history and modern agricultural production to give Elderhostel visitors a synopsis of delta farming.

"Truth is, Eli Whitney probably didn't really invent the cotton gin, but instead he borrowed the idea from a plantation blacksmith named Ogden Holmes."

Some in the audience raise eyebrows when I throw in that little known historical debate. But I press on.

"Indisputable, though, is the fact that the first cotton lint cleaner was built by a slave at Blakely Plantation here in Vicksburg in 1840."

Our Elderhostel participants come from all over the country. Most of them are somewhat familiar with timber, livestock, corn, soybeans — all important agricultural commodities in →

After conducting a session on historical gardens of the south, Extention Horticulture Agent, Felder Rushing, shares a century-old garden magazine with an Elderhostel participant.
(Photo courtesy of Terry D. Rector.)

County Agent Terry Rector uses "Freddy" in part of a discussion on environmental issues facing agriculture in his presentation to Elderhostel.
(Photo courtesy of Roland Peterson.)

Mississippi. So I concentrate on the things produced here that are not as widespread. Mississippi leads the nation in farm-raised catfish production, ranks third among the states in cotton acreage, and seventh in growing broilers.

In addition to a 1 1/2 hour presentation and question and answer session, the September and October "classes" are taken on a delta tour of cotton and rice harvesting, a cotton gin in operation, and a catfish farm at feeding time.

I make sure to inform the audience about the ever-growing response of agriculture to environmental issues. I tell about our state and county programs for recycling pesticide containers, the Boll Weevil Eradication program and reduced tillage and no-till farming. I take the opportunity to briefly share the history and concept of the Land Grant university system.

Our Extension Horticulture Agent also makes a presentation called "From Camellias to Kudzu" that focuses on traditional plants of the South.

Elderhostel is informal education at its best. Participants come to learn about the area and to see the sights, but not to face an overloaded schedule or be subjected to too many details.

Working with an Elderhostel program really offers an opportunity for those of us with educational roles in agriculture. As the percentage of people directly involved in agriculture continues to dwindle, here's a chance to send new "ambassadors" back to mostly urban communities throughout the country.

It takes only a minimal amount of time to prepare for presenting a program. Remember, the goal is to merely highlight local agriculture. No soil chemistry, taxonomic names, or plant morphology is required. Presentations could easily be planned and presented by FFA or 4-H members.

Assisting with Mississippi College's Elderhostel program has provided me a working relationship with the Department of Continuing Education at the college, which is a secular college located 30 miles from Vicksburg. As a result, the department has asked me to collaborate on a short course for elementary and secondary school guidance counselors from three states. My assignment is to discuss careers in agriculture.

I recommend working with Elderhostel audiences to agriculture educators. The "students" are mature, laid back, inquisitive, and open-minded.

What Can Elderhostel Do For You?

Elderhostel programs can offer a number of benefits to the participating organizations. Good public relations and increased agricultural literacy are certainly important benefits. An on-site Elderhostel program can provide income by making use of under used facilities at conference centers and community colleges. The Elderhostel participants may also provide additional opportunities for collaboration in the future.

The most important benefit may be the opportunity for a rewarding teaching experience and inter-generational exchange. Young people can learn a great deal from the older adults while teaching them about local agriculture.

Where to Contact Elderhostel

If you are interested in finding out about Elderhostel opportunities in your state or how you might start your own program, contact ELDERHOSTEL, 75 Federal Street, Boston, Massachusetts 02110-1941. Elderhostel activities are coordinated in each state by a state or regional director who can answer questions and advise those interested participating in the program.

References

Elderhostel, (1995). Elderhostel: United States and Canada Catalog. March 1995, Number 9. ■

When Two Worlds Meet

(Continued from page 14)

other possible links that could be made in our school system. An English teacher is now interested in collaborating with agricultural education and other departments to help with those units which involve writing and/or report giving in order to become stronger within the technical curriculum area. Mathematics teachers are being encouraged to join forces with the technical and vocational courses to make mathematics more practical and applicable for students. It is yet to be seen how much of this will come to pass, but the changes coming in education may help foster the idea of joining departments in a common goal of educating a student.

When two worlds meet, great things can happen. Collaboration in agricultural education and across the entire school curriculum has become a common theme for discussion and development. ■

Networking with extension: Give and You Shall Receive

BY: JULIA A. GAMON

Dr. Gamon is associate professor of agricultural education and studies at Iowa State University, Ames.

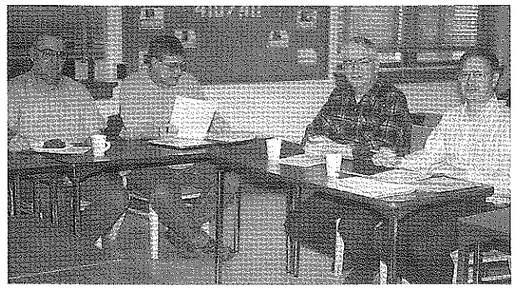
In agricultural education, we seem to be programmed to return favors. If someone gives us something or does something for us, we feel obligated to give or do something in return, often something of greater value in time or money. Social psychologists (Cialdini, 1984) call this the reciprocal principle and suggest that we take note of the human tendency to repay those who help us. If you are willing to give to others, you will find that they will return the favor many times over.

In this article, I am going to suggest several ways in which the reciprocal principle can work for agricultural educators who are teaching in public schools or are in various extension settings and other professional in comparable fields. First, the sharing of materials and personnel is helpful to both groups of agricultural and extension educators. Secondly, the use of educational research is valuable to both groups. Even though, from a practical view, we do not acknowledge its contribution to our work. Thirdly, networking between personnel at various levels can also function as a valuable collaborative means of providing educational and employment opportunities.

Sharing of Materials

Sharing instructional materials is one of the easiest ways to begin networking with others. Local extension offices have a range of materials including bulletins, videos, and computer programs based on the latest research. Many of these are free or may be loaned or copied. The 4-H program has a wide range of project and leader manuals. Frequently, these materials are also available for use in a course.

There may be problems with some extension materials. Often, these are designed for adults in informal learning settings. They need to be adapted for high school or postsecondary audiences. Study guides and tests that are common for school settings are generally not a part of extension resources. 4-H materials tend to be designed for younger audiences and may need to be modified.



The Iowa Vocational Agriculture Teachers Association's instructional materials committee meets regularly to plan the contents of the summer packet.

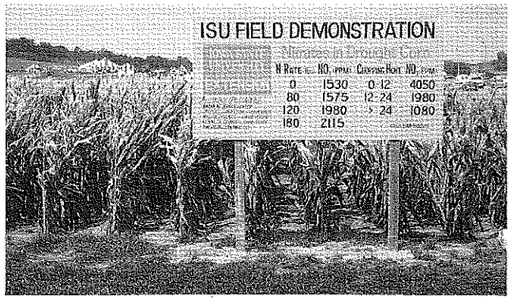
(Photo courtesy of Julia A. Gamon.)

Sharing materials should be a reciprocal affair. Agriculture teachers also have resources useful to extension audiences. One example of this exchange is procedure and leadership materials. The Agricultural Education Club at Iowa State University has developed a "parliamentary procedure" program which 4-H groups have used in their training sessions for club officers. The ISU Agricultural Education Materials Service also has a resource packet for teaching leadership that is appropriate to extension groups.

Some materials have been developed specifically with both 4-H and FFA audiences in mind. One example is the Total Quality Management (TQM) Curriculum for Youth Producers (1993). It includes seven videos and an instructional booklet which focuses on food safety concerns. It was designed and produced by extension specialists in Iowa and Nebraska. In Iowa, agriculture instructors received copies of the TQM materials as part of their summer instructional packet under a special arrangement with the state 4-H office.

Other instructional packets in recent years have included extension materials: two swine videos developed by Dr. James McKean, state extension veterinarian, and a set of six water quality videos produced by Dr. Tom Glanville, state extension agricultural engineer. These materials included a computer program and a set of questions in a game format to accompany the videos.

The Iowa Vocational Agriculture Teachers Association instructional materials committee is composed of teachers from each of the districts. They meet four times a year to review materials and make decisions on what should be contained in an annual instructional packet. The teachers make some of the contacts with extension specialists to arrange for development of materials. Currently, Jim Green, agriculture instructor at Riceville, is working with the Iowa Turkey Federation and a state extension poultry specialist to develop materials for use in the instructional packet. →



Extension field days and Extension specialists are good sources of research-based informaion.

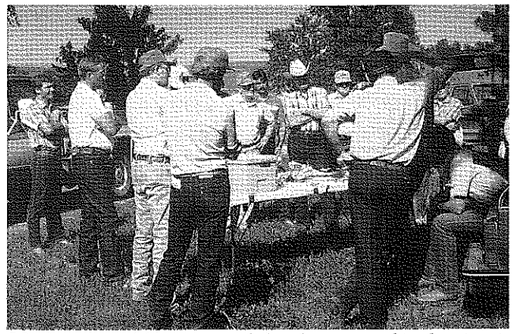
(Photo courtesy of Julia A. Gamon.)

Extension specialists have been particularly helpful in reviewing materials for content accuracy before they are distributed to agriculture teachers. In all cases, they were eager to have the latest in research information accurately disseminated to teachers and were appreciative of the multiplier effect of teachers reaching future agriculturists.

Agriculture teachers were able to reciprocate to extension specialists by helping them test materials. Jeff Lorimor, an extension animal waste management specialist, currently is using agriculture teachers to try out draft copies of an environmental assurance program that he is writing. As teachers use the technical presenter's guide with their students, they can provide helpful comments to him that will enhance the finished manual. The teacher's background and experience in teaching methods will help him design a manual that will be a useful, polished, instructional aid for anyone teaching about waste management.

Sharing of Personnel

Sharing of personnel is of benefit to both public school agricultural education and educational programs of cooperative extension. As a county youth agent, my first contact with the field of agricultural education was through asking agriculture teachers to judge 4-H exhibits and 4-H presentations. I also worked with teachers as we scored livestock judging contests at the county fair. My extension colleagues and I met monthly with all of the agriculture teachers in the county. Later when I became a state 4-H specialist, I found that agriculture teachers were willing helpers for the state tractor contest, and now that I am on the other side of the fence, I find extension colleagues willing presenters at in-service activities for agriculture teachers.



Joint inservice activities are a good place for agents and teachers to network.

(Photo courtesy of Julia A. Gamon.)

Some states have experimented with one week job exchanges for extension agriculturists and agriculture teachers. The certification problem has been solved in several ways. Often the extension agent has a teaching background (in Iowa, close to a third of the extension agriculturists have at least one degree in agricultural education). Some schools have used substitute teachers in tandem with the extension personnel. In other cases, principals have monitored the agriculture classes while the regular teacher is gone. The exchanges yield benefits for both sets of personnel. Schools gain new expertise in the classroom. Extension benefits from a person with expertise in teaching methods and working with youth.

When lines of communication between extension educators and agricultural educators have not been strong, the following suggestions are provided:

- Get on extension mailing lists.
- Attend extension programs.
- Stay in touch with the extension office secretary.
- Discover the strengths and interests of extension specialists so that you can ask the right person for assistance.
- Contact extension personnel a long time ahead of the date you choose. Their calendars fill early.
- Arrange for several contacts during the semester or year. Two-day presentations allow for more in-depth coverage and rapport between students and the extension presenter.
- Prepare students ahead of time with an assignment built around the upcoming presentation by extension personnel. Afterward, have the students write reports as well as thank-you notes.

Educational Research

Research on leadership has been completed with both 4-H and FFA groups. When Seevers and Dormody (1994) studied leadership development activities, they found that both groups considered holding office and judging contests to be among the activities they felt contributed the most to their leadership development. 4-H members listed holding office and teaching younger members at the top (Seevers & Dormody, 1994); for FFA members it was judging contests and public speaking (Dormody & Seevers, 1994). →

Agricultural educators at the university level have completed a number of studies evaluating extension programs and providing recommendations for future programs. For example, a study by Ambe, Bruening, and Murphy (1994) recommended that tractor operators be involved with extension educators in teaching safety educational materials. A study by Gamon, Harrold, and Creswell suggested that extension educators change their emphasis on meetings and conferences as methods for reaching clientele.

In almost every state, the agricultural education field has been a prime choice for extension educators who are pursuing advanced degrees, and their master's research studies have benefited extension. An example is the study on extension administration by Earnest and McCaslin (1994) that identified conflict management styles and personality types of district directors. As more and more states require advanced degrees for their extension personnel, providing the appropriate courses at convenient times and places is an important role for university agricultural educators.

Job Opportunities

Networking between extension educators and agriculture teachers can result in clearer views of what is required in each job. Because their undergraduate preparation is similar, teachers and agents are able to change from one occupation to the other. In some states recent graduates with bachelor's degrees tend to start out teaching and then change to extension. In other states, job changes are in the other direction.

Disadvantages to both jobs are the long hours and often stressful conditions. Advantages to both include the value to society and the satisfaction that comes from helping make a positive difference in the lives of others.

Although aspects of the two jobs are similar, there are specific differences. Extension agents have more control over their time than do teachers, while teachers have more direct contact with young people than extension personnel. Agriculturists work mainly with adults and so do youth agents, whose main clientele are the volunteer adults who reach the youth.

Implications

A willingness to network and collaborate with extension educators will return very positive dividends for agricultural education teachers. The reciprocal principle, which states that humans feel obligated to repay in larger measure what they have received, suggests that if we give to others, we will receive in full measure.

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Leadership Development Workshop

(Continued from page 15)

The FFA officers felt the workshop was a huge success. They want to see the activity continued. Since the FFA officers had to work together to design and conduct the workshop, it served to bring them closer and to function more effectively as a team. As a result, the officer team has worked more closely than others in the recent past.

The leadership workshop provided many other benefits. FFA officers reported the event helped publicize the FFA, and it is now better understood by other students of the school. One officer reported that she felt other students learned that FFA is for more than just farm kids.

Students learned the value of team work and what can be accomplished in an organization if members work together as a team. One participant indicated that she learned how to be more involved and participate in group activities, and everyone realized team work equals success.

The workshop served to bring students of various interests, cultures, ages, and programs of the high school together. Participating in group activities taught students the need to work together, get along, and value each other. As a result, the event served to create more harmony throughout the student body during the remainder of the year.

In summary, a leadership development workshop with FFA officers collaborating with other students in a school was beneficial to many. FFA officers fine-tuned their own leadership skills while teaching others. Participants in the workshop were able to use the leadership skills to more effectively serve as officers of their organizations. All students involved learned the value of collaboration and how it enhances a program's success.

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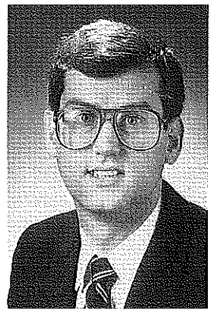
Hydraulic System Model for Teaching Fluid Power Principles



BY DONALD M. JOHNSON AND CLIFTON R. BRAKER

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Introduction

Much of the "muscle" required in modern agricultural production and processing is supplied by hydraulics. Virtually all tractors, combines, and many agricultural field machines rely on hydraulics in some way. Also, hydraulic actuators (cylinders and motors) are found on much of the equipment used in processing agricultural products.

Because of the widespread use of hydraulics in agriculture, it is important for students to develop an understanding of the basic principles of physics that explain the operation of hydraulic systems. The purpose of this article is to describe an easily-built hydraulic system model (Figure 1) that can be used to actively involve the students in studying hydraulic principles and applications. A sample learning activity for use with the model is also presented.

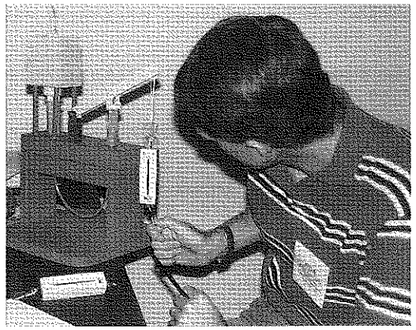


Figure 1. Arkansas inservice workshop participant using the hydraulic system model. *(Photo courtesy of Jasper Lee.)*

Basic principles of Hydraulics

In 1653, a French scientist named Pascal formulated the fundamental law that explains the operations of all hydraulic systems. The law, which became known as Pascal's law, states that:

> Pressure applied to a confined fluid is transmitted undiminished in all directions, acts at right angles to the walls of the container, and acts with equal force on equal areas.

Pascal's Law can be illustrated using the container of liquid shown in Figure 1. A 1-lb. force applied to the friction-less stopper (having a surface area of 1-in.^{2} in contact with the fluid) will result in a pressure of 1-lb./in.^{2}(psi)

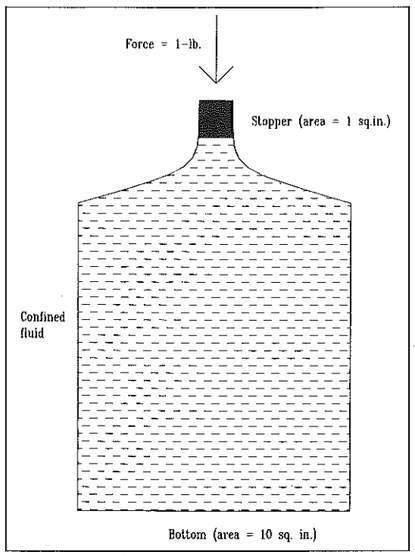


Figure 2. Example Application of Pascal's Law. *(Figure courtesy of Donald Johnson and Clifton Braker.)*

being exerted on the fluid (1-lb. x 1-in.^{2} = 1 psi).

Since, according to Pascal's Law, the pressure applied to an enclosed fluid acts with equal force on equal areas, each 1-in.^{2} of the container's surface will receive 1-lb. of applied force. Thus, because the bottom of the container has an area of 10 in.^{2}, the 1-lb. force applied to the stopper will result in 10-lbs. of force being exerted against the bottom of the container (1 psi x 10-in.^{2} = 10 lbs. force).

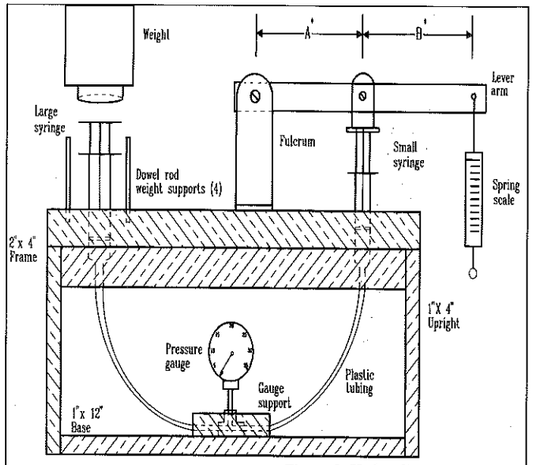
As you can see, Pascal's Law explains how multiplication of force occurs in a hydraulic system. The relationship between force, pressure, and area in a hydraulic system can be represented mathematically, as shown in Equation 1.

Equation 1. $F = P \times A$

where,
F = Force (lbs.)
P = Pressure (psi)
A = Area (in.^{2})

Hydraulic Model Construction

As shown in Figure 3, the hydraulic system model is constructed around two syringes. The small syringe acts as the input cylinder and the large syringe acts as the output cylinder. The two syringes are connected by a length of clear →



Note: Lever distances A and B should be equal.

Figure 3. Hydraulic system model. (Figure courtesy of Donald Johnson and Clifton Braker.)

plastic tubing, friction-fitted to the end of each syringe. A gauge is connected in the tubing so that fluid pressure can be measured. The syringes and tubing are fill with water.

A measured input force can be applied to the small syringe using a spring scale attached to the second-class lever. The output force (load) consists of an object of known weight (5 to 10 lbs.) fitted to the large syringe. The syringes are supported be blind holes drilled into the wooden frame. Smaller pilot holes allow the tubing to extend through the bottom of the frame, while preventing movement of the syringes. The hydraulic system model can be built for less than 15 dollars.

Hydraulic System Learning Activity

The purpose of the hydraulic system model is to provide students with active, hands-on experience that allow them to learn the basic principles of hydraulics. The authors have found the activity presented in Figure 4 to be an excellent way of providing structure to students' use of the model.

Figure 4. Sample Hydraulics Learning Activity.

Objectives: Upon completion of this learning activity, students should be able to describe the principles and applications of hydraulic power transmission, calculate the actual and theoretical mechanical advantage of a hydraulic system, determine the efficiency of a hydraulic system, and describe the relationship between force, pressure and area in a hydraulic system.

Equipment & Supplies: Hydraulic System Model, Calculator, Ruler or Vernier Caliper.

Procedure:

1. Obtain necessary equipment and supplies from your instructor.

2. Place a load of known weight (5-10 lbs.) on the plunger of the large syringe.

3. Slowly pull downward on the spring scale and record the amount of force required to raise the load on the large syringe. Record your measurement here: _____lbs.

4. Calculate the actual mechanical advantage of the hydraulic system using the following formula:

$$\text{Actual Mechanical Advantage} = \frac{\text{Force exerted by large plunger (weight of load)}}{\text{Force exerted on small plunger x 2*}}$$

Actual Mechanical Advantage = _____

*Note: The handle of the hydraulic system model is a second class lever that produces a 2:1 mechanical advantage. Since we are interested in the mechanical advantage produced by the hydraulic system only, the "2" is included in the denominator to cancel out the lever's mechanical advantage.

5. Determine the theoretical mechanical advantage of the hydraulic system.

   A. Determine the area (in.^{2}) of the large plunger using the following formula:

$$\text{Area, in.}^2 = \pi r^2$$

where,
π = pi, which is equal to 3.1416
r = radius of plunger

Record the area of the large plunger here: _____ in.^{2}.

   B. Determine the area of the small plunger using the same formula as in 5A.

Record the area of the small plunger here: _____ in.^{2}.

   C. Calculate the theoretical mechanical advantage using the following formula:

$$\text{Theoretical Mechanical Advantage} = \frac{\text{Area of large plunger}}{\text{Area of small plunger}}$$

Theoretical Mechanical Advantage = _____

6. Calculate the efficiency of the hydraulic system using the following formula:

$$\text{Efficiency (e)} = \frac{\text{Actual mechanical advantage}}{\text{Theoretical mechanical advantage}} \times 100$$

Efficiency (e) = _____

7. Determine the relationship between force, pressure and area in the hydraulic system.

   A. Place the weight on the large plunger.

   B. Apply just enough force to the small plunger to balance the weight.

   C. With the weight balanced, read the pressure gauge. Record the fluid pressure reading here: _____ psi.

   D. Divide the weight of the load by the area (in.^{2}) of the large plunger (obtained in Step 5A).

$$\frac{\text{\_\_\_\_ lbs.}}{\text{\_\_\_\_ in.}^2} = \text{\_\_\_\_ psi}$$

   E. Compare the calculated pressure (7D) to the measured pressure (7C). If there is a difference in the two figures, can you explain why?

Discussion Questions:

A. Define "efficiency" as it relates to the performance of a hydraulic system.

B. How is efficiency related to actual mechanical advantage and theoretical mechanical advantage?

C. What factor(s) prevent a hydraulic system from being 100% efficient?

D. What is the relationship between force, pressure and area in a hydraulic system?

Summary

Hydraulic power transmission is widely used in the agricultural industry. The hydraulic system and the learning activity presented in this article were designed so that students can learn the basic principle of hydraulics in a hand-on manner. As agricultural educators move to a more science-based curriculum, we must remember the importance of providing students with active learning experience. Hopefully this article will encourage teachers to share materials and activities they have found to be successful with their own students. ■

Learning Partnership

(Continued from page 10)

include attention to both characteristics of process and partners (Karls et al., 1992).

Desired characteristics of the partnership process include:

1. Written statement of common goals that is clear and concise and that is recognized and developed cooperatively.
2. Assessment of the talents and resources each partner possesses and is willing to commit to the partnership.
3. Provision of sufficient time and in-service training to plan, sustain, enhance, and evaluate the partnership.
4. Cooperative effort involving all key players that utilize the talents of the partners.
5. On-going communication that is inclusive of all individuals and institutions in the partnership.
6. Sharing of responsibility and accountability.
7. Periodic evaluation of the partnership process.
8. Celebration of successes.
9. Identifying new possibilities for future work among partners.

Desired characteristics of the learning partners include:

1. Belief in ability to bridge different cultures among partners.
2. Evidence of mutual respect and trust among partners.
3. Realistic expectations of the partnership, often built from small successes. (pp. G-47-48)

Partnerships thoughtfully planned and executed can raise the energy and resources for an agriculture program, no small matter in these times of funding constraints. Attention to the desired features, needed intensity, motivations, and functions of the learning partnership can result in a comprehensive portfolio of hard working and productive partnerships serving the unique needs of a program. The "fourth power" in learning partnerships in gained by investing in all four of the potential partner categories — reaping their benefits to improved learning by focusing on good process and partner principles.

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About the Cover

The sciences of food, fiber, agriculture, and renewable resources have, traditionally, been viewed as applied disciplines related almost exclusively to farming. The result was the establishment of a food and fiber system unparalleled around the world. However, it has also resulted in the agricultural industry being considered the world's greatest polluter, the most irresponsible polluter, and an irresponsible user of natural resources. This belief has stemmed from a changing society that has little regard for the food and fiber system and a great deal of suspicion about agricultural products. It is time to change. The future success of the food and fiber system depends on how we, as agriculturists, collaborate with all disciplines of education. Whenever people understand the food, agriculture and renewable resource system, there is at least a chance to develop a more positive perspective of the importance of this system. The time for collaboration is now!