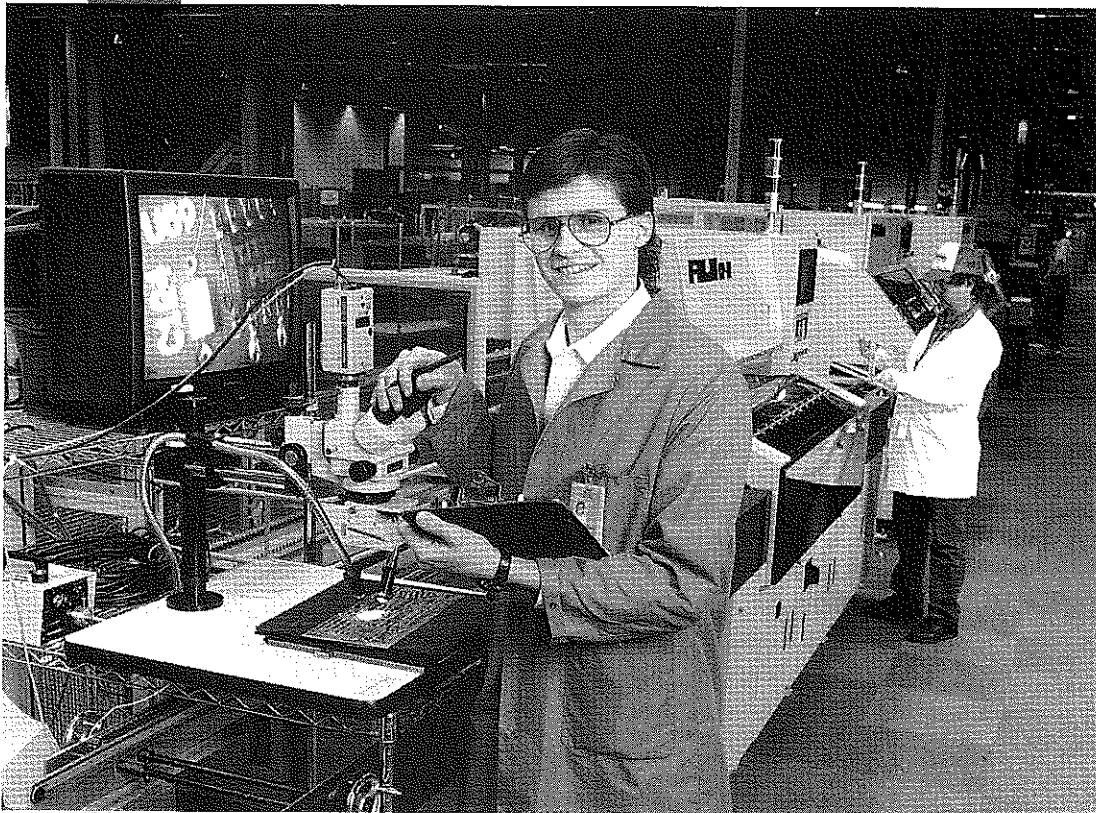


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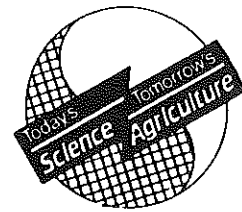
Tech Prep

Articulation

Curriculum Change

Implementation Strategies

THE AGRICULTURAL EDUCATION MAGAZINE



January, 1994

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Table of Contents

	Page
EDITOR'S COMMENTS	
Articulation and Integration - The Keys To Tech Prep	<i>Ed Osborne</i> 3
THEME EDITOR'S COMMENTS	
Tech Prep - Articulation Check!	<i>William L. Thuemmel</i> 4
THEME ARTICLES	
Delivering an Education That Works	<i>Kimberly Perry</i> 5
Tech Prep - A Flood of Change.....	<i>Marty C. Mahler</i> 7 <i>Larry Vold</i>
Implementation Strategies for Tech Prep	<i>Clark R. Harris</i> 10 <i>Robert J. Birkenholz</i>
Making Transitions in Agricultural Education Through Tech Prep	<i>Dean Sutphin</i> 13
ASSISTANTSHIPS AND FELLOWSHIPS IN AGRICULTURAL EDUCATION.....	<i>Joe G. Harper</i> 16
FEATURE COLUMNS	
International Agriculture.....	<i>Robert A. Martin</i> 17
Teaching Tips	<i>William G. Camp</i> 21

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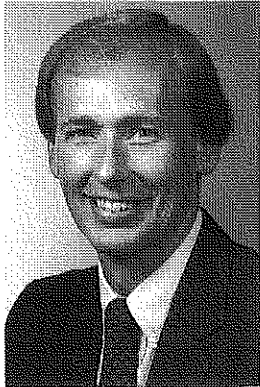
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Articulation and Integration – The Keys to Tech Prep



BY ED OSBORNE

Dr. Osborne is associate professor and program chair of agricultural education at the University of Illinois, Urbana-Champaign.

Can Tech Prep become widely applied in agricultural education, or in education in general for that matter? While some success stories have emerged, the jury is still out on the impact of Tech Prep on schooling. The basic design of Tech Prep makes it a new educational reform idea that is hard to dispute - integration of basic and applied studies, collaboration among teachers in all subject areas, employer involvement, and articulation of course content both within and between levels of schooling. Current investments in Tech Prep are staggering. In FY94 for Illinois alone, over \$7 million is budgeted for Tech Prep, including \$4.2 million in federal funds. If money is the key element in making an educational program work, we should expect nothing less than successful implementation of the Tech Prep initiative. Unfortunately, change in education is not so easy.

Integration of basic and applied studies serves as one of two cornerstones in the Tech Prep design. Curriculum integration has been strongly promoted for the past several years, even prior to the conception of Tech Prep. Perhaps the most obvious area for integration in agriculture is between basic sciences and science applications in agriculture (agriscience). In this scenario, integration can occur by sharing course materials; discussing course objectives and activities; developing complementary course outlines; team teaching; sharing lab materials, equipment, and resources where appropriate; working together to organize local science fairs; sharing professional literature of common interest; involving science teachers in agriscience SAE programs and FFA activities; and similar activities. Tech Prep relies on a strong and equal partnership between teachers of basic and applied studies, like science and agriculture. Such cooperation and integration should be beneficial to teachers and students alike.

Articulation is the coordination of course content both within and between secondary and postsecondary institutions. Articulation within the institution is (sometimes falsely) assumed to be present, so much of the Tech Prep focus on articulation is between institutions. Articulation can occur by forming teacher/administrator articulation committees that meet on a regular basis to review course outlines. Many

four-year universities and community colleges have been using articulation agreements to ensure similarity of courses accepted for transfer credit. This articulation is fairly straightforward - teachers agree to teach similar course content at their respective institutions. However, Tech Prep articulation is a horse of a different color. Tech Prep articulation focuses on content and content sequence, where secondary course content is coordinated with subsequent course content at the next level of schooling. Prerequisite knowledge and skills become critical as students are prepared for the next level in the articulated program.

Integration and articulation are the keys to success, or failure, in Tech Prep. To vocational educators, Tech Prep is an exciting new idea that could potentially move vocational education closer to the mainstream of schooling. Tech Prep represents a significant change in the way all teachers and administrators believe that educational institutions should conduct their business. When placed in that context, even with the tremendous state and federal dollars being designated for Tech Prep implementation, the chances of achieving the goals of Tech Prep seem fair at best. Tech Prep is a vocational education initiative, and the dollars driving the program are coming from vocational education. Tech Prep only becomes a partnership when teachers in the basic disciplines accept our invitation to collaborate and rethink how we educate our students. Tech Prep requires not only a change in philosophy on the part of many teachers and administrators, it also requires a change in procedure.

Integration and articulation raise a number of concerns and fears on the part of many teachers. Some science teachers think agriscience has no place in a science curriculum. This view seems to stem from either (1) the perception that agriculture is not a science-based field and high school agriculture courses lack rigor (usually a function of the level of abstractness in the course content) and/or, (2) a fear that agriscience courses may pull students away from basic science courses. On the other hand, many agriculture teachers fear that the more science and agriculture courses are integrated, the less need there will be for agriculture

(Continued on page 15)

Tech Prep - Articulation Check!



BY WILLIAM L. THUEMMELE

Dr. Thuemmel is associate professor and head of agricultural and occupational education at the University of Massachusetts, Amherst.

The terms "technical preparation" and "agricultural education," when spoken, emit a harmonious and rhythmic sound. Conceptually, they are kindred spirits -- one expects graduates of agricultural education programs to be technically prepared. Operationally, quality agricultural education and technical preparation go hand-in-hand. So why the thematic focus on Tech Prep in this issue of *The Magazine*? Because Tech Prep is a hot school-to-work topic that is educationally integrative, has congressional support, and holds great potential for strengthening the competitiveness of the American worker and entrepreneur, including those of us in agriculture. As agricultural educators, we need to check our Tech Prep!

Articulation

Articulation, according to my dictionary (Merriam Webster's Collegiate Dictionary, 10th edition), can be defined as "the action or manner of joining or interrelating." The core of Tech Prep is articulation of high school programs with those at the postsecondary level in occupational areas (referred to as 2 + 2). However, Tech Prep can be much more than 2 + 2. Articulation, though, in various forms and dimensions, seems to be the essence of Tech Prep. Some authors characterize articulation as a process, others as an attitude or even a goal.

As educators reflect on actions akin to "joining or interrelating," a number of articulation-related concepts come to mind -- integration, guidance, collaboration, linkage, sequencing, cooperation, communication, transition, involvement, team-teaching, and partnerships -- to name a few. All these concepts are familiar to agricultural educators. They bring to mind some distinctive and/or integral components of agricultural education, such as advisory councils, FFA, SAE, occupational experience, program planning and evaluation, leadership and personal development, student recruitment and follow-up, and curriculum design. Agricultural educators have the philosophical knowledge, cognitive understanding, and applied skills that articulation activities require. Unfortunately, many of us are still operating as an appendage or satellite, both programmatically and professionally, to mainstream public education. The world in general, and American education in particular is undergoing rapid transformation. Nations are becoming more interdependent, our

economies more globalized; so, too, must our educational programs become. No contemporary agricultural education program or agricultural educator can survive for long without articulating more closely with the educational mainstream. Tech Prep holds great potential for our profession, and our profession has much to contribute toward improving the quality of educational programs at all levels and in several disciplines! The time is ripe to stop "preaching to the choir" and spend more time and effort articulating with other teachers, institutions, and professional organizations.

Tech Prep Check

Most, if not all, states have someone in a leadership role to coordinate and facilitate Tech Prep. These individuals are often located in state departments of education. Do you know who your state's Tech Prep coordinator is? Have you met with your coordinator and discussed how your program and students can benefit from Tech Prep?

Tech Prep actually begins with career awareness and exploration programs in the elementary classrooms. What are you as an agriculture teacher doing to ensure that contemporary agricultural content is part of the career clusters being introduced to the elementary and middle school students in your school service area? Is your availability as a resource person well known to other teachers in your school district? Or, if you are an agricultural teacher educator, are you working with other teacher educators to make sure future elementary, middle, and high school teachers being prepared on your campus have an accurate understanding of agriculture as it relates to their subject area curricula? The same applies to those future career counselors and school administrators who are being prepared on your campus.

This issue of *The Magazine* is a primer on Tech Prep for agricultural educators -- teachers, administrators, supervisors, teacher educators, and other specialists; from elementary schools through institutions of higher education. The authors of articles in this issue are to be complimented for their initiative and resourcefulness in tackling a rather complex theme. Tech Prep is happening across the country. These articles provide considerable insight, perspectives, and approaches on Tech Prep and agricultural education. ■

Delivering an Education That Works



BY KIMBERLY PERRY

Ms. Perry is Executive Director, Postsecondary Agricultural Education, Alexandria, VA.

Public education in the United States is currently spending the bulk of its funding on 45% of its students - the 30% who will attend a four-year college and the 15% who are members of special populations (economically and academically disadvantaged, disabled, and limited English speaking proficient.) In fact, 55% of tax dollars are spent on the college-bound student. The impact of the minimal funding for the remaining 55% of the students is tremendous - decreasing test scores, increasing drop-out rates, poor self-esteem.

Unfortunately, our response to poor achievement has been to lower educational standards rather than try to modify instructional techniques which would serve the majority of our students more effectively. The impact is being felt at the postsecondary level as well.

Because of the low academic levels of entering students, postsecondary occupational/technical curricula contain approximately 35% course work that should have been learned before the students left high school. (1)

Assumptions are often made about this "forgotten half" (sometimes called the "neglected majority") of our high school students. They can't be motivated to learn and don't have the ability to handle "academic" subjects. But research and experience indicate that indeed these students can succeed, if courses are taught in the manner in which these students learn best.

The learning process is: aligned with learner outcomes, relevant to the student's life experiences, personalized, active and experiential, freeing and empowering, and rigorous. A feeling of community among students is created. (2)

The Educational Reform Movement, as it has been labeled, began with the United States Congress creating and appropriating funds in Title III Part E - Tech Prep Education of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990. This movement is now called "Transition from School-to-Work." It actually began with the applied academics instructional approach with Tech Prep education, national skills standards, and now youth apprenticeship. In fact, a bill was introduced to Congress last summer, cited

as the "School-to-Work Transition Act of 1993." The draft bill language indicates that two of the Act's purposes are to:

- * build on and advance a range of promising programs, such as Tech-Prep education, career academics, school-to-apprenticeship programs, cooperative education, youth apprenticeship, and business-education compacts;
- * improve the knowledge and skills of youth by integrating academic and occupational learning, integrating school-based and work-based learning, and building effective linkages between secondary and postsecondary education. (3)

Predominate in both the draft Transition Act and the Perkins Act is the importance of secondary and postsecondary linkages. In fact, Tech Prep Education is a sequence of study beginning in high school and continuing through at least two years of postsecondary occupational education. The key to successful Tech Prep Education is the formation of a consortia of institutions that provide educational opportunities that lead to a highly skilled, qualified workforce that is better prepared to meet the needs of our globally competitive American economy.

Since 1990, \$350 million have been appropriated for Tech Prep Education. According to the Perkins Act of 1990, any Tech Prep Education program shall:

- * Be carried out under an articulation agreement between the participants in the consortium;
- * Consist of the two years of secondary school preceding graduation and two years of higher education, with a common core of required proficiency in mathematics, science, communications, and technologies designed to lead to an associate degree or certificate in a specific career field;
- * Include the development of Tech Prep Education program curricula;
- * Include inservice training for teachers and counselors;
- * Provide equal access to the full range of technical preparation programs to individuals who are members of special →

TECH PREP EDUCATION PATHWAY

Grades 7-8	Pre-Tech Prep <ul style="list-style-type: none"> * Career Awareness * Basic Academics 	
Grades 9-10	Tech Prep Foundation <ul style="list-style-type: none"> * Applied Academics * Career Exploration * Select Occupation Cluster 	
Grades 11-12	Technical Clusters <ul style="list-style-type: none"> * Begin Technical Courses * Continue Applied Academics * Work Site Learning 	Graduation Options <ul style="list-style-type: none"> * Enter the Work Force * Articulate to Postsecondary * Baccalaureate Institution
Postsecondary	Technical Speciality <ul style="list-style-type: none"> * Advanced Skills * Advanced Academics * Work Experience 	Certificate/Degree Options <ul style="list-style-type: none"> * Enter the Work Force * Transfer to Baccalaureate Degree Program

populations; and

- * Provide for preparatory services which assist all participants.

The Perkins Act only includes students in the last two years of high school and the first two years of postsecondary education. Yet, if Tech Prep Education is to be effective, it must begin in the middle school years with career awareness and basic academic instruction (bearing in mind student learning styles).

What is career awareness? On a personal note, it came as a shock to learn that I would have to work for a living for a great portion of my life. There was absolutely no discussion at school or at home about life after graduation (of course, going to college was a foregone conclusion). As a result, career awareness, exploration, and decision all occurred while in college with limited guidance from the college itself. If not for the agricultural education major and professor . . . , well, I shudder to think about it. Would my decisions have been different had career awareness, exploration, and preliminary preparation occurred at the secondary level? Probably. Any regrets? Absolutely none!

I was lucky. The majority of students who don't receive any career development assistance flounder. Tech Prep Education builds on a foundation of career awareness at the middle school, to career exploration and applied academics in the first two years of high school, to technical courses and work-site learning in the

last two years of high school, and to advanced skills and academics and work experience in postsecondary education. (See the Tech Prep Education Pathway chart.)

A well designed Tech Prep Education program provides students with a wide range of options. Graduating high school students can:

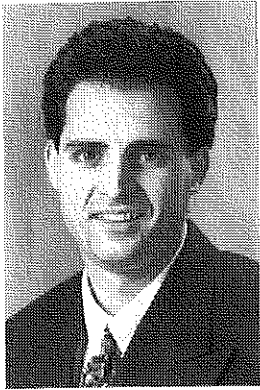
- * Change their career orientation, choosing a different cluster of future occupations;
- * Elect to go to work immediately upon high school graduation;
- * Articulate to a postsecondary institution;
- * Continue their education at a baccalaureate institution;
- * Transfer from a postsecondary to a baccalaureate institution.

The end result is that all students must be prepared to effectively enter the workforce, whether it be with a high school diploma, technical certificate, associate's degree, bachelor's degree, or more. The question yet to be answered is "will schools be redesigned and teachers prepared for this potential new paradigm in education?"

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- (1) Hull, Dan. (1993). *Every Student Wins*. Center for Occupational Research and Development.
- (2) Copa and Pease, *New Designs for the Comprehensive School*, National Center for Research in Vocational Education
- (3) *School-to-Work Transition of 1993*. Senate and House of Representatives of the United States of America.

Tech Prep: A Flood of Change



BY MARTY C. MAHLER
&
LARRY VOLD

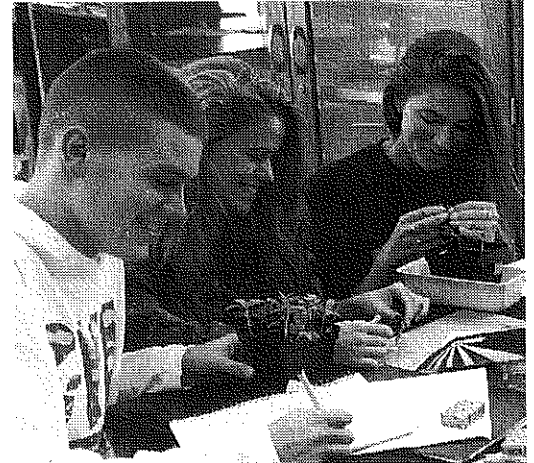
Dr. Mahler (top) is State Tech Prep Director, North Iowa Area Community College, Mason City. Mr. Vold is an agriculture teacher at Forest City Community High School, Forest City, IA.

I will study and prepare myself, and someday my chance will come.

--Abraham Lincoln

What has brought about the need for educational transformation such as Tech Prep? Because of changes in the U.S. and world economies, the American educational system and the U.S. population have focused increasing public attention on the importance of helping American youth make the transition from school to work, particularly among young people who do not attend four-year colleges. In short, several factors have contributed to our current situation. Firstly, our educational system has perpetuated for years a system where academic and vocational education were separated, as though learning for knowing was different from learning for doing. Secondly, limited collaboration has existed between educational entities, business/industry/labor, and communities. And thirdly, in recent years there have been dramatic changes in the technologies being used, ultimately requiring graduating students to possess a completely different set of competencies and skills than ever before. There are no less than a dozen current reports that quickly point out the dilemmas of our educational system and workforce development. Each report comes in response to multiplying concerns about the readiness of American youth to take up productive roles in a changing economy.

One of the true highlights of being in agricultural education is observing students who have gone on from high school agriculture to find gainful employment and satisfying careers in agriculture. Much as Abraham Lincoln dutifully studied and read in preparation for his career, many of our students in past decades found the traditional career path to be a predictable formula. Hard work and perseverance led to a wealth of job opportunities, and advancement often followed quickly as the new employee honed a particular skill. It was not unusual for a hard-working high school graduate to earn his or her way into management positions simply by being responsible, dependable, and loyal to the business. The agriculture industry has many people who can testify to this progression, and these virtues are not to be taken lightly -- indeed, they still comprise the backbone of what employers look for when hiring new employees. Somewhere in the late



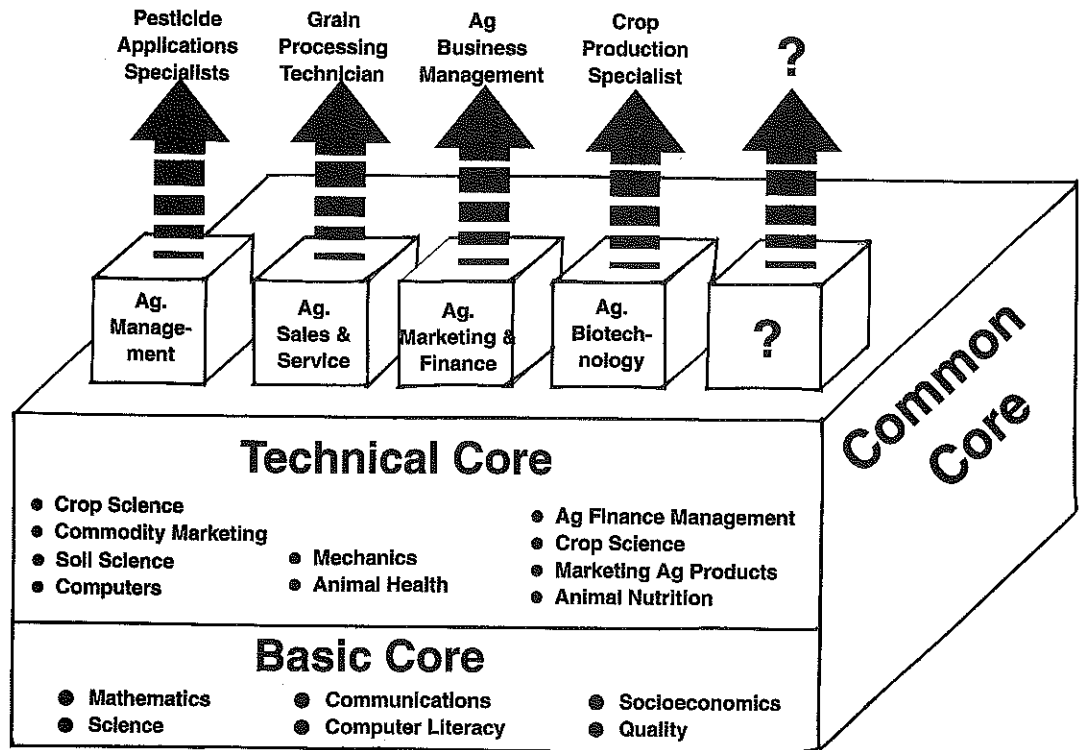
Agriculture students learn valuable technical skills through lab activities such as plant growth and development. Crop scouting applies these skills as a career.

1970s and early 1980s, the playing field for agriculture careers began to change, tilting dramatically in favor of the new generation of "the technologically literate." At first the change was gradual, as agricultural industries began installing computers and increasing their automation. This was followed by tributaries of entrepreneurs who dared to risk their venture capitol on such radical concepts as robotics, bioengineering, pneumatic designs, and the like. But as production agriculture faced the financial squeeze of the 1980s, the changing job market became evident, even to those who had initially resisted. And much like the floods which swept across the landscape here in Iowa this past summer, it has become very apparent that everyone involved, from industry leaders to educators to students and parents, is being served notice of a flood stage situation in today's job market. In the case of Iowa, many believe what is washing away are the old, traditional jobs -- unskilled, and semi-skilled, repetitive and predictable. In the aftermath of this flood are the technical jobs of the 21st century -- many of which will exist in ten years but have not even been defined today!

For this reason, schools must address this vital question in every agriculture program throughout the country, "How can we best meet the needs of the changing workforce in our own agricultural industry?"

At Forest City High School, major changes have been initiated in the way agriculture is offered. Three twelve-week trimesters →

Tech Prep Curricular Structure



are used to allow more flexibility in scheduling. This has allowed many more students, who would have traditionally passed over the agriculture program because of college prep tracking, to sample a diverse curriculum. Aquaculture, horticulture, natural resources, and biotechnology are some of the new courses which have replaced conventional production agriculture as the circumstances have changed in the community's agricultural industry.

Also significant have been physical changes which, figuratively speaking, have brought down the "walls" which formerly separated departments. For example, agricultural mechanics is still available, but as an applied extension of a technology class which features systems and processes such as mechanical, fluid, thermal, and electrical.

A common expression is "tough times call for tough people", and teaching in agriculture in the 1990s is certainly no exception. Never has the demand to "keep up" been so great, and at the same time the margin for error been so small. It is a serious matter as we help direct young people into career paths today, knowing full and well that mistakes can mean years of additional expense and possible limitations in some job markets. Many university-bound graduates are discovering what they really need are increased technical skills, while at the same time many technical college graduates feel they could have gotten that four-year degree after all.

Statistics show 75% of the jobs in the next 15-20 years will require more than a high school diploma, but not necessarily a four-year degree. Thus, it is appropriate that secondary agriculture programs continue to expand their articulation efforts and communicate a better "match" between high school graduates and their chosen career path. The mission of vocational-technical education in Iowa is to provide opportunities for all students to choose, prepare for, and advance in their lifelong career or vocations. This shall be accomplished by integrating what has traditionally been called vocational-technical and academic education into a system that provides opportunities which enable people to live in a global society, capable of competing in a world market workforce, and receptive to lifelong learning. (A New Vision for Vocational-Technical Education in Iowa, February 3, 1992).

What one quickly finds is that Tech Prep is as much a change process as it is the development of a new curriculum. Our educational system must adopt a mission to prepare all students for further learning and productive employment. One of the goals in a 1989 report from the National Summit on Agricultural Education was, "to provide cutting edge technology, training, and information, and promote life-long learning at every level throughout the profession." This goal is certainly aligned with the mission of Tech Prep in this country. Clearly, we are a work-oriented society →

and believe in life-long learning. No one could dispute the idea that every young person today should be prepared to do both. This is not to imply there will be a fixed target. In fact, surveys continue to show that people change jobs four to six times on the average in their career. Agriculture careers, as they always have been, require life-long learners.

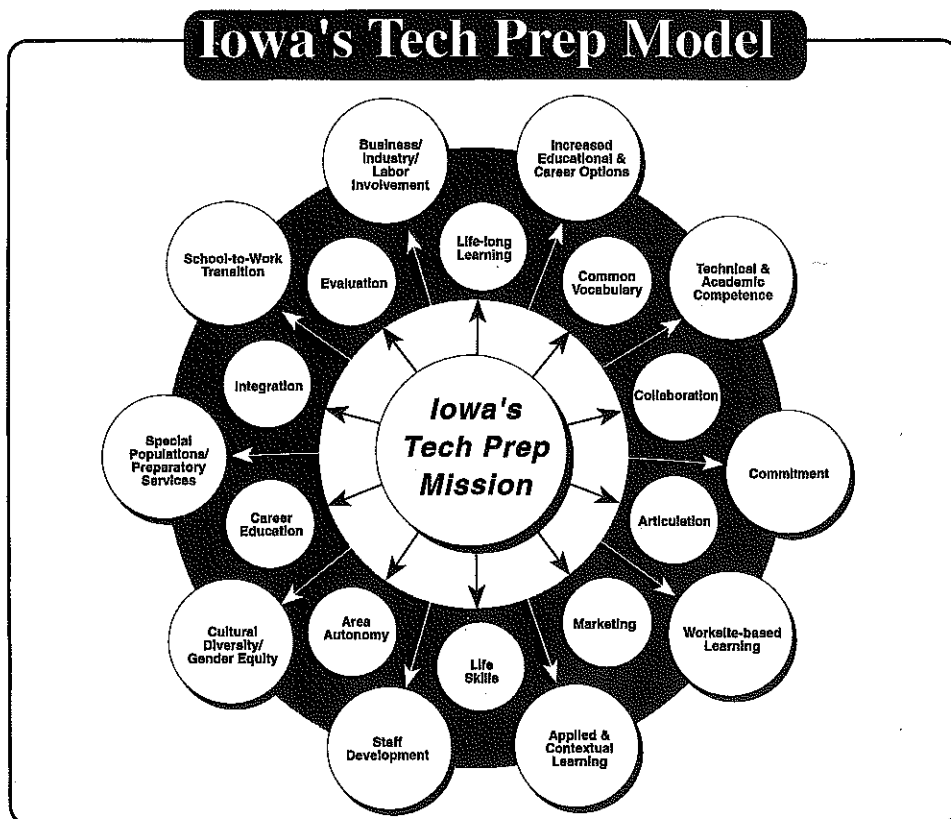
The primary reasons for developing the model for Tech Prep in Iowa were to (1) develop consistency in the public's expectation of Tech Prep, (2) create a framework to improve Tech Prep program articulation between local education agencies, community colleges, and four-year colleges and universities, and (3) develop a model for site-based program design, implementation, and evaluation. The model consists of 20 components (see below). While the model sets out the key components of a successful Tech Prep program, the model is not designed to be either a checklist of activities or a punitive document. Rather, it is designed to provide the state with a consistent model Tech Prep consortia with the necessary autonomy for each region's own individual characteristics.

At the time of the development of the model, five parallel issues critical to the overall development of Tech Prep in Iowa were also identified. The five parallel issues consisted of acceptance of applied course work, licensure/certification, financial resources, technical core development, and statewide leadership. Each of the parallel issues is considered to be a critical element in the future sustainability of Tech

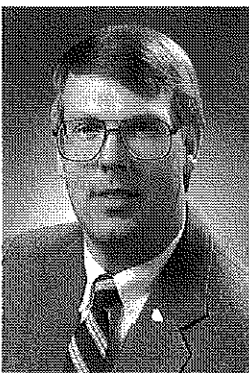
Prep programs in Iowa.

Change can be painful, and making necessary transformation in agriculture programs, particularly programs with a proud and solid tradition, will not be without controversy. We have reached a critical point in this country's educational evolution which requires deep systemic changes. If you are not uncomfortable with the changes others are requiring of you, then you may not be headed in the right direction. The changes that are required with Tech Prep will most likely not be ones which will be logical and easy. Convincing parents that all students need to think K-14 rather than K-12 is just one example of the challenges awaiting us. For years and up to the present there has been only one socially acceptable curriculum for students to take while at the secondary level. This curriculum requires students to make a huge step from the secondary level to a four-year institution. A sensible and gentle transition can be achieved by students attaining a two-year postsecondary degree first. Giving up some turf, whether it be facilities or classtime, in exchange for building partnerships, team-teaching, and integrating academics with traditional vocational education, are bold steps. Ultimately, agriculture programs will prevail because they have always been close to the practical, hands-on real-world applications. Probably never before has there been such a need for workers who can connect between the

(Continued on page 23)



Implementation Strategies for Tech Prep



BY CLARK R. HARRIS
&
ROBERT J. BIRKENHOLZ

Dr. Harris (top) is Director of Tech Prep, State Fair Community College, Sedalia, MO. Dr. Birkenholz is associate professor of agricultural education at the University of Missouri, Columbia.

Agricultural education programs must prepare students for high tech jobs of the 21st century. The Tech Prep concept is designed to address the need for a highly skilled work force. Tech Prep is a comprehensive process which requires cooperation from many different individuals. Tech Prep involves more than developing applied academic courses or articulation agreements between secondary and postsecondary programs. These are very important components, but they alone do not meet the goals of Tech Prep. The main goals of Tech Prep are (Edling, 1992):

- to provide a meaningful alternative to "college prep";
- to prepare students for employment or for further education toward an Associate of Applied Science (AAS) degree;
- to create a smooth transition from secondary to postsecondary programs;
- to strengthen secondary and postsecondary technical programs;
- to give most students a strong academic foundation; and
- to increase the use of contextual learning in academic courses.

Successful implementation of all aspects of Tech Prep will require cooperation from vocational-technical teachers, academic teachers, guidance counselors, and administrators, as well as individuals from business and industry. The Heart of Missouri Technical Education Consortium (HOMTEC, see figure 1 on page 11) includes individuals from each category. HOMTEC is a combined effort of State Fair Community College (SFCC), 13 area vocational-technical schools, sending high schools, and representatives of business and industry from a 22 county area.

There are many factors to consider regarding the implementation of Tech Prep. Some of the important factors include: career awareness/exploration, career clusters, the college prep mind set, meaningful educational plans for all students, counseling and guidance, rigorous academic courses, contextual learning, articulation agreements, improvement of technical content, and the incorporation of SCANS skills.

Educators have begun to recognize that a

major function of education should be career preparation. Therefore, students must be provided with more comprehensive career awareness and exploration programs. Career awareness should begin in elementary classrooms and expand into a career exploration program at the middle school. Career awareness programs should address a wide range of careers from all walks of life, including agriculture.

Career awareness programs should be developed around career clusters that are organized to reflect a group of related occupations. Edling (1992) noted that career clusters offer an advantage in that students have more flexibility to shift from one program to another within the cluster, because academic course needs are similar for the related careers. Some students change their minds about their career goals, but they generally stay within related fields. For example, a student is very unlikely to switch from the career field of dentistry, to theater, to agricultural mechanics. But a student might change from one emphasis area in agriculture to another.

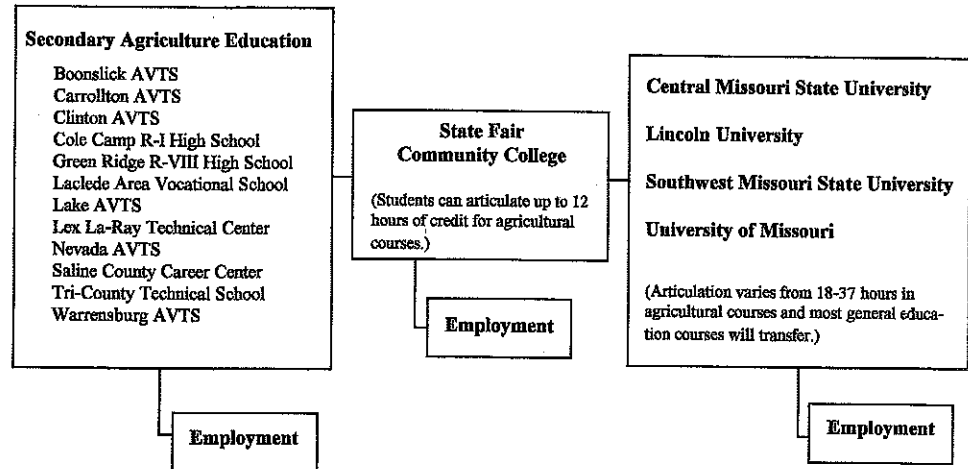
Oregon has mandated that all students select a cluster to follow. This has provided students more direction in selecting classes. The following are the career clusters that Oregon (Oregon Department of Education, 1993) has established:

- Arts and Communications;
- Business and Management;
- Health Services;
- Human Resources;
- Industrial and Engineering Systems; and
- Natural Resource Systems (which includes agriculture).

In Missouri, less than 20% of all students complete a baccalaureate degree. Even so, the college prep orientation directs secondary education curriculum decisions. Many educators focus on how many students can complete the college prep certificate, rather than assessing the educational/occupational needs of each student and how they learn best. Hull and Parnell (1991) identified this as one of the five major barriers to excellence in American schools. They have reported that our schools have →

Figure 1 - Articulation Model for Tech Prep Associate Degree at State Fair Community College

Heart of Missouri Technical Education Consortium Agricultural Articulation Model



declared college prep as the one and only definition of educational excellence. Agricultural educators must take steps to change the mind set that college prep is the only path to success.

Students who wander aimlessly through high school usually are not successful at gaining a quality education or at achieving a rewarding career. Students and parents must understand that a general education diploma is no longer the ticket to a career that will support a family. It will become their ticket to under-employment.

In many high schools, only college prep students are offered a meaningful educational program that prepares them for challenging employment or continued education. Most students are allowed to select courses from a smorgasbord of choices. Many course alternatives do not contribute substantially toward career success. For example, one high school in the HOMTEC Consortium requires students to earn 24 credits for graduation, with only 12½ credits in required courses. Of the required credits, students may select academic courses with little rigor. As a result, the high school diploma produces graduates with neither employment skills nor the academic background needed for further education.

All students should be provided with a meaningful educational plan -- a plan that will enable students to develop solid academic foundation from applied academic or college prep courses. The courses in each student's plan should adhere to guidelines provided by the career cluster the student has selected (see sample Educational Development Plans).

We must all become better educational and

career counselors for students. We cannot depend entirely upon guidance counselors to assist students in making career decisions. Counselors are frequently flooded with administrative paperwork and unable to serve students as they would like. We must also provide and encourage students to enroll in rigorous academic and applied courses. Courses that will give the students the foundation to understand why things work and how they work will help make the knowledge gained more transferable.

AGRIBUSINESS AND NATURAL RESOURCES

Four Year College Degree - Sample Careers

<ul style="list-style-type: none"> Agricultural Salesperson Agricultural Scientist Agonomist Cooperative Extension Service Worker Farm Manager 	<ul style="list-style-type: none"> Forester and Conservationist Horticulturist Landscape Architect Park Ranger Soil Conservationist
---	--

Educational Development Plan (EDP)

Ninth Grade:	Tenth Grade:
<ul style="list-style-type: none"> English I Algebra I Physical Science American History Physical Education Health - Computers Agricultural Education: Plant Science/ Agriscience 	<ul style="list-style-type: none"> English 10 Geometry Biology American Foreign Policy - 20th Century America Foreign Language Elective Agricultural Education: Animal Science
Eleventh Grade:	Twelfth Grade:
<ul style="list-style-type: none"> English 11 Algebra II Chemistry/Biology II Foreign Language Electives/Agricultural Education 	<ul style="list-style-type: none"> College English Trigonometry/Calculus Physics/Principles of Technology Government Electives/Agricultural Education

(Sample) College - 1st Semester

<ul style="list-style-type: none"> English Composition I Ag Orientation Principles of Animal Science College Algebra Plant Science Physical Education 	<ul style="list-style-type: none"> 3 1 3 3 4 1 <li style="border-top: 1px solid black;">15 hrs
---	---

(Sample) College - 2nd Semester

<ul style="list-style-type: none"> Principles of Biology General Chemistry General Psychology Public Speaking 1A 	<ul style="list-style-type: none"> 4 5 3 2 <li style="border-top: 1px solid black;">17 hrs
--	---

The majority of students do not possess the academic foundation needed to function →

in today's technical jobs. Many high school students have been allowed to take low level academic courses to meet graduation requirements. Courses like general math, consumer math, general science, and functional English are designed to make education as painless as possible. In many cases, such courses have not challenged students to meet their educational potential. As a result, their career outcomes fall short of their career potential. Educators, parents, and students must raise their expectations that the majority of students can learn academic concepts. History has shown that students usually perform to their level of expectation.

Industry representatives involved with HOMTEC hire less than 25% of their job applicants, even though there is an unmet demand for employees. This is due to the low level of mathematics, communications, technical, and workplace skills of the applicants. As a result, some schools have started to require algebra and/or geometry to receive a high school diploma. Many schools are also requiring students to take rigorous academic courses to be considered Tech Prep students, and therefore, eligible for college articulation credit and scholarships

Many schools across the country are teaching courses that have been developed to meet these needs. Courses such as Applied Communications, Applied Biology/Chemistry, and Applied Mathematics use specific agricultural examples, as well as other examples from the world of work. Principles of Technology (an applied physics course) uses many workplace

examples that offer students insight into the physics involved in agriculture.

Applied academic courses are a good start toward achieving contextual instruction in academic classrooms. Agriculture teachers should continue to encourage the use of more contextual examples. One way to do this is for the agriculture instructors to serve as resource persons for academic teachers. This cooperation will improve the academic foundation of all students, as well as providing an insight into agriculture for academic students and teachers.

Educators at all levels must work together to create quality articulation agreements to allow for the efficient transition of students through their educational career. Students should not be expected to repeat course material from one educational level to the next. Turf barriers need to be overcome, and agricultural educators should continue to recognize the efforts of fellow agricultural educators. Educators at each level should work together to identify student competencies they have in common in order to eliminate duplication, provide students with articulated courses that provide enhanced skills, and better prepare students for the highly technical jobs of the future.

HOMTEC has developed articulation agreements (see example in Table 2) between 12 secondary agriculture programs and SFCC that allow qualifying students to transfer up to 12 hours of college credit to the community college from a secondary agriculture program.

(Continued on page 23)

Table 2 - Model of Agricultural Course Sequence for Tech Prep Associate Degree

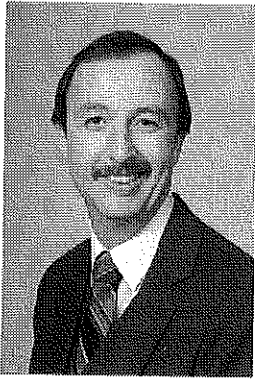
**Tech Prep - HOMTEC (SFCC)
Working Sample of Animal Science Emphasis**

SUBJECT	HIGH SCHOOL				POSTSECONDARY			
	Freshman	Sophomore	Junior	Senior	Freshman A	Freshman B	Sophomore A	Sophomore B
MATH	Applied Math I	Applied Math II	Geometry	Algebra II*	Intermediate Algebra			
ENGLISH	English I, II, and III and Applied Communication (4 Units)				English I		Business Communications	
SCIENCE	Applied Biology / Chem.	Biology	Principles of Technology I	Chemistry*	Botany*	Intro to Chemistry		
HUMANITIES	Geography, History, and Government (3 units)						Humanities	History/Government
OTHER	Health / PE				Physical Education	Career Planning II	Microcomputer Applications in Business I	Career Progress II
OTHER	Keyboarding & Computer Operation	Microcomputer Applications						Employment Seminar
TECHNICAL COURSES	Agriscience I (Animal Science)	Agriscience II (Plant Science)	Advanced Agriculture Courses:		Introduction to Soils	Livestock Management	Agribusiness Management	Ag Credit & Finance
TECHNICAL COURSES			Animal Science (3)**	Career Planning I (1)**				
TECHNICAL COURSES			Adv. Animal Science (3)**	Career Progress I (1)**	Natural Resources	Farm Chemicals	Animal Nutrition	Soils II
TECHNICAL COURSES			Ag Management & Economics (3)**	Marketing Farm Com (3)**	Plant Science	Summer Occupational Internship (7)		General Horticulture

*Suggested optional courses

**Files of college credit earned

Making Transitions in Agricultural Education Through Tech Prep



BY DEAN SUTPHIN

Dr. Sutphin is associate professor of agricultural education and chair of the Department of Education at Cornell University, Ithaca, NY.

Technology Preparation (Tech Prep) programs, the rage in vocational and technical education, are providing the philosophical and funding bases for future programming. Unfortunately, agricultural educators haven't found much in Carl Perkins legislation to cheer about. There are few Tech Prep programs in agriculture, compared with other vocational fields.

This article explores educational aspects of the Tech Prep initiative and offers possible applications for education in agriculture. Examples drawn from the New York State Tech Prep programs in 12 pilot high schools and technical centers show positive program transitions.

Student Base

The target population for Tech Prep is the forgotten half of high school students, that is, students who are neither the highest nor the lowest academic ability. They actually represent the neglected majority. Daniel Hull, President and CEO of the Center for Occupational Research and Development, states that there are two major misconceptions about this segment of the student body:

They can't be motivated to learn.

They really don't have the ability to handle academic subjects.

These students are traditionally segmented into the "general curriculum" that often leads to neither further education nor a career. Tech Prep seeks to remedy this aimless drifting through the public school system by helping students find exciting and meaningful learning opportunities and develop career aspirations.

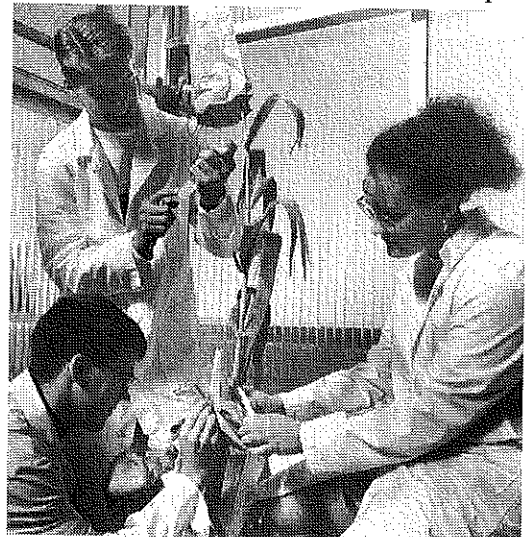
Since Tech Prep courses are not restrictive, they often draw high academic ability students who already plan to enter college. Similarly, lower ability students may be attracted to the hands-on learning. This range of students could be problematic in some classrooms, leading Tech Prep advocates to focus educational activities on the middle range of students.

Agriculture teachers who traditionally serve a wide range of academic ability level students may ask, what's new? When instruction is targeted, guidance counselors and others have a clear message and may be more inclined to counsel students into the program. Moreover,

educators generally support programs that are specifically focused on moving students out of general education into a career or higher education path. Results from the New York experience, Fall 1993, show that 50% of the students in Tech Prep are ones not previously attracted to the agriculture program.

Curricula

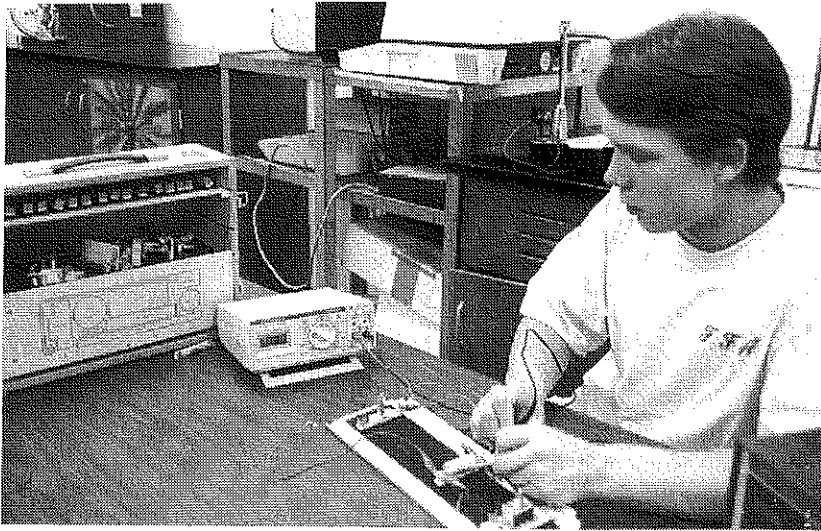
Learning environments for Tech Prep programs integrate vocational and academic curricula. Academic teachers in science, mathematics, technology, and communications are involved with vocational teachers in develop-



The school greenhouse provides an excellent environment for introducing biotechnology techniques. Corn is one of many crops undergoing exciting developments in research.

ing the curriculum. These teachers meet periodically in teams to plan the instruction and engage in team teaching. As a result, academics are taught through hands-on learning activities, often community and laboratory based. Technical instruction, according to Hull (1993), has a strong academic foundation, career focus, and combines education with training. The enriched context for learning helps students to transfer their academic understandings to work and builds cooperation skills that are so valuable in the workforce. Students see a purpose for what they are learning in school. Academic teachers have a higher level of satisfaction in teaching, and vocational teachers are connected more closely with other teachers in their school.

In New York state, the Tech Prep →



Students with competency in the electricity/electronics area will find numerous technician opportunities in agricultural mechanics and technology. (Courtesy of Larry Vold)

initiative has led to major transitions in the high school curriculum. The high school courses are college-like, on a semester basis, and content rich. They serve as introductory to major components of a two-year college program. Contemporary and innovative curricula are being developed by teams of two-year college faculty, agriculture teachers, high school academic teachers, and those who have skills in the technical areas. Team teaching and planning is leading to integrated and interdisciplinary learning in each school setting.

Granted, agriculture teachers typically involve English teachers in judging contests or speech writing. Students learn mathematics when they calculate volume board feet and numerous other classroom and laboratory activities. The differences in Tech Prep and the current agricultural education curriculum include systematic, planned curriculum development and instruction involving a team of high school and college faculty. The curriculum continuum from high school through college provides smooth transition and opportunities for exit and re-entry. The New York program includes seven semester courses, each of which can be expanded to more than one semester. The curriculum includes environmental studies, plant and animal sciences, managing an enterprise, mechanical science, food science and technology, and aquaculture.

Instructional Strategies

Instructional strategies in technology preparation programs are familiar to agriculture teachers: goal setting, career planning, hands-on learning, integrated classroom and laboratory learning, and community-based education. School-to-work transition is enhanced through occupational experience, integral to agricultural education, and which sometimes includes apprenticeship programs in Tech Prep. School-to-college transition and students' higher educa-

tion aspirations are enhanced by taking field trips to college laboratories and by using college faculty as resource speakers in high schools.

Portfolios associated with Tech Prep are emerging as an effective instructional and assessment strategy for all areas of education. Simply stated, portfolios are collections of an individual's work, not just a list of grades or test scores. In the New York program, portfolios are used in three ways: 1) assessment of progress, 2) career exploration, and 3) determination of possible advanced placement or college credit in the State University of New York's two-year colleges at Alfred, Cobleskill, and Morrisville. The Instructional Materials Service at Cornell has developed a three-ring portfolio notebook including five sections: introduction, personal program, employability skills, integrating academics, and career exploration. Students will continue their portfolios through college in the Tech Prep curriculum.

Strong science-based laboratories are another important area of development in the New York program. Science kits and laboratory materials are being matched with the new curriculum. They are being purchased or developed with Carl Perkins funds.

Thus, Tech Prep utilizes current strategies in agricultural education leading to an easy transition for most agriculture teachers. If teachers use student occupational experience record books competently as an instructional strategy, portfolios should be easy to employ as a teaching strategy. The strong science component of a Tech Prep agriculture program may require inservice education.

Staff Development

New curriculum, enhanced instructional strategies, and strategies to recruit another segment of the student body are best learned through teacher inservice. Carl Perkins provides funding for these important areas.

Approximately two weeks of inservice education is required of teachers in the New York program. The instruction during inservice models the laboratory teaching that will be expected of teachers. Teachers are given the curriculum and additional laboratory materials that they will need for instruction. There is also time to discuss implementation of the curriculum. In addition, inservice is including school administrators, guidance counselors, and academic teachers, along with college faculty.

Programming and Evaluation

Tech Prep is more than a curriculum, it is a program with key components. Tech Prep may be statewide, as in New York, or regional within a state. In either case, there are →

common features.

Hammons (1992) suggested focus components of an educational program that are useful areas for evaluation. Applied to Tech Prep in New York, these include eight distinct areas.

Administration/organization refers to the organizational structure to carry out the coordination and programming. *Articulation* includes an agreement with local schools, colleges, and business and industry. *Curriculum development* includes the design and implementation of a 2 + 2 instructional program, high school through college. *Staff development* is accomplished through inservice education of faculty and staff in order to implement a Tech Prep program. *Promotions/marketing* provides information to students, parents, and other stakeholders that leads to student enrollment. Most importantly, the *student* must be considered in terms of enrollment, achievement, retention, and completion of the program. *Career* exploration, guidance, and placement are essential ingredients for a complete program. Finally, *resources*, including human and fiscal inputs, are needed to develop and maintain the program.

The New York Tech Prep initiative has a comprehensive assessment plan, including student questionnaires and interview schedules for school staff and students. The plan calls for following students throughout high school and college. Follow-up of graduates will also be possible.

Summary

Tech Prep is synonymous with change. It can be a vehicle to make transitions in agricultural education that lead to program renewal. The results can include students who would not enroll in the traditional program, curriculum update, enhanced classroom and laboratory teaching strategies, inservice, and program development and evaluation. While Tech Prep is a vehicle and a source of funding for change, parts of the concept can be utilized in any program. Or curriculum change can be initiated through teacher innovation, supported by state or local revenues and human resources.

References

- Hammons, F.T. (1993) *The tech-prep evaluation component*. (unpublished paper presented at New York's Statewide Tech-Prep Coordinators Conference) Albany, New York.
- Hull, D.M. (1993) *Opening minds, opening doors the rebirth of American Education*. (Unpublished paper presented at the new York Tech Prep conference). Syracuse, New York.

Articulation & Integration . . .

(Continued from page 3)

courses - our uniquenesses will be lost. These concerns are to be expected as serious questions are finally being raised about the wisdom of compartmentalized teaching. But agriculture can be a part of an integrated curriculum, yet offer a unique contribution to the education of students.

To be sure, Tech Prep raises many such concerns and questions that will need to be positively resolved before much progress is made. Whether Tech Prep will be effective in dissolving the traditional student tracking system in today's schools is the big question. Tech Prep is an initiative that seems to be taking shape as it is being implemented, making acceptance by teachers and administrators even tougher. But even if Tech Prep does not become widely successful, greater collaboration, rather than isolation, among teachers will be a success in itself. ■

Coming in February . . .

Theme: Distance Education

- Preparing a Course
- Teaching Strategies
- Planning and Delivering

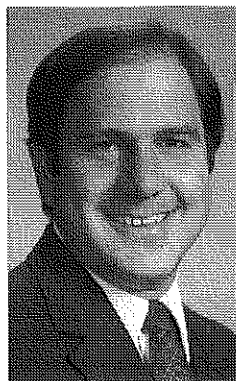
About the cover . . .

Travis J. Asklund, 1990 Leander High School Tech-Prep graduate, has been promoted an astonishing seven times since he joined Texas Instruments in June of 1990. His postsecondary training has included study at Austin Community College, as well as industry training in Six Sigma, Leadership, and Total Quality Management. Today, T.J. is a member of TI's Austin site Production Control team. He describes his early days as more "manual" than his job today, which he says is more "brain work within the administrative sector of manufacturing. The Tech Prep education plan was extraordinary. Tech Prep teachers turned math, science, and communications into something I dealt with in real life. For example, in math, I didn't just memorize equations; I practiced using equations to solve problems."

(Courtesy of Cassy Key)

1994-1995 Report

Assistantships and Fellowships in Agricultural Education



BY JOE G. HARPER

Dr. Harper is associate professor of agricultural education at Clemson University, Clemson, SC.

The 1994-95 survey of institutions offering assistantships and fellowships in agricultural education is provided by the Publications Committee of the American Association for Agricultural Education. This survey is published annually to assist those in the profession who are seeking information about graduate studies.

Key to Understanding

The information is provided in the following order: nature of assistantships (number available); number of months available during the year; beginning months of employment; amount of work expected; monthly remuneration and other consideration

such as remission of fees; whether aid is for master's, advanced graduate program, or doctoral students; source of funds; the 1994 deadline for application; and the person to be contacted. Slight variations in this pattern are due to the nature of the data provided by reporting institutions.

University of Arizona

Graduate Teaching Assistantship (1); July 1; one-half time; \$9,380 per fiscal year; out-of-state tuition waived; Master's of Agricultural Education degree or Master's of Science degree; Dr. Roger T. Huber, Head, Department of Agricultural Education, 224 Forbes Building, University of Arizona, Tucson, Arizona 85721, telephone (602) 621-1523, FAX (602) 621-9889.

University of Arkansas

Research Assistantship (1-3); July 1; one-half time, 20 hours/week; \$767-975 per month; full tuition provided; master's or doctoral; May 1; Dr. George Wardlow, Director of Graduate Studies, Department of Agricultural & Extension Education, Agriculture Building Room 301-B, University of Arkansas, Fayetteville, Arkansas 72701, telephone (501) 575-2035.

Teaching Assistantship (1); September 1; one-half time, 20 hours/week; \$855 - 1,089 per month; full tuition provided; master's or doctoral; May 1; contact same as above.

Clemson University

Graduate Teaching/Research Assistantships (3); 10 months; August through May; one-half time; \$650 - 800 per month plus remission of out-of-state tuition and three-fourth fees; master or doctoral; SDE and/or instruction funds; May 1 or until filled; contact Dr. Lloyd H. Blanton, 112 Poole Agricultural Center, Clemson University, Clemson, South

Carolina 29634-0356, telephone (803) 656-3300, FAX (803) 656-5675.

Cornell University

Teaching Assistantship (1); 9 months; September; 15 hours/week, \$9,820 (\$516.88 bi-weekly); waiver of tuition and fees; doctoral, state funding, April 15. Dr. Arthur L. Berkey, Department of Education, 418 Kennedy Hall, Cornell University, Ithaca, New York 14853, telephone (607) 255-2198.

Research Assistantship (1); 9 months; September 1; 15 hours/week; \$9,075 for 9 months (\$477.64 bi-weekly); waiver of tuition and fees; master's and doctoral; Hatch Act and other research funds; April 15; contact same as above.

University of Florida

Teaching/Extension Assistantships (2); 9-12 months; August; 14-20 hours/week; out-of-state fees waived; Master of Science; remuneration varies depending upon position; April 1; Dr. Carl E. Beeman, Department of Agricultural Education & Communications, 305 Rolfs Hall, University of Florida, Gainesville, Florida 32611, telephone (904) 392-0502.

University of Illinois

Graduate Research Assistantships (3); 9-10 months; August; one-half time; \$925 per month doctoral, or \$750 per month master's; in-and out-of-state tuition and nearly all fees waived; April 1 or until filled; Dr. Ed Osborne, Chair, Agricultural Education Program, University of Illinois, 328 Mumford Hall, 1301 W. Gregory Drive, Urbana, IL 61801, telephone (217) 333-3166.

Iowa State University

Research Assistantships (5); 9 months; September; one-half time, 20 hours/week; \$1,000 per month; fee reduction; master's or doctoral; Agricultural Experiment Station; March 1; Dr. Richard I. Carter, Head, Department of Agricultural Education and Studies, Iowa State University, Ames, Iowa 50011, telephone (515) 294-6950.

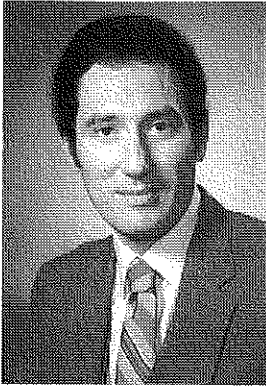
University of Minnesota

Research Assistantships (2-5); 9-12 months; July or September 15; 10-20 hours; \$884-1,086 per month (50%); tuition reduced by two times % time appointed; master's or doctoral students; University; April 15; Dr. Edgar Persons, Head, Division of Agricultural Education, 320 Vocational and Technical Education Building, University of Minnesota, 1954 Buford Avenue, St. Paul, Minnesota 55108, telephone (612) 624-2221.

Graduate School Fellowships in Vocational Education (2); 9 months; September 15; none, but full-time students; \$1,500 - 2,000; master's or doctoral students of outstanding potential;

(Continued on page 19)

International Agriculture



BY ROBERT A. MARTIN

Dr. Martin is associate professor of agricultural and extension education at Iowa State University, Ames, IA.

Global education involves learning about those problems and issues that cut across national boundaries, and about the interconnectedness of systems -- ecological, cultural, economic, political, and technological. Global education involves perspective taking -- seeing things through the eyes and minds of others -- and it means the realization that while individuals and groups may view life differently, they also have common needs and wants (Hanvey, 1976).

The old phrase "what goes around comes around" seems appropriate if we refer to the statement by Hanvey.

This statement, made nearly 20 years ago, seems to be even more appropriate for today. In view of agricultural education's stake in the future development of the agriculture industry, it seems that now more than ever is the time to take an inventory of our learning outcomes or expectations as they relate to agriculture in its global context.

The Question

The most often asked question these days is what should be taught and to what extent should it be taught. The content of the curriculum is a never-ending debate. The answer to the question seems to vary according to where one resides and the dimensions of the teaching position one has at the time of the question. However, it does seem appropriate for teachers to consider a variety of learning outcomes that could be infused into the curriculum to add a global perspective to the study of agriculture, regardless of the specific program emphasis of the department or school district in which a teacher may be located.

International Agriculture Learning Outcomes

The essence of this article is a listing of approximately 100 learning outcomes related to international agriculture that were included in a recently conducted national study. The purpose of the study was to determine the extent to which these learning outcomes should be addressed in the study of agriculture at the secondary school level. Although the data are still being analyzed, it is important to share the list of "potential" learning outcomes with teachers who might want to use the concepts included in the list to add a global perspective to their curriculum. It is not likely that all learning outcomes will be used by all teachers, but it is likely that teachers might want to use some of these learning outcomes to add a global perspective to their agriculture programs. The list is divided into several sections. Teachers should scan the list and determine which, if any, of these learning outcomes could become a part of one or more units of instruction. In addition, these lists of learning out-

comes might be useful in revising the curriculum and integrating the agriculture curriculum with other curricula in the school. Perhaps you are already teaching some of these learning outcomes in your program. Why not conduct an inventory of your program using the following list as a guide?

I. Global Farming Systems:

- Identify farming techniques used in selected countries
- Describe farming systems in selected countries
- Explain the effects of use of insecticides on different soil types/environments of the world
- Describe climatic conditions in selected countries
- Compare and contrast "family farming" in selected countries
- Match agricultural machinery needs to availability and appropriateness of machinery in selected countries
- Explain the methods of transferring new technologies to farmers
- Describe the various mechanisms of insect pest and disease control of crops and livestock in selected countries
- Identify the origin of major crops of the world and their interrelationships
- Explain the effects of use of fertilizers on different types of soils
- Compare a labor intensive agricultural system in a given country with a mechanized agricultural system in another country
- List major fruit crops grown in selected countries
- List all spices grown in a given country
- Identify the major crops of African countries
- Identify the major crops of Asian and Pacific countries
- Explain the impact of seasons on agricultural production in a given country
- List the different methods of irrigation in selected countries
- Compare and contrast the use of intensive agricultural land use practices to a more open and less intensive system of land use
- Explain the nutrient recycling process in the farming systems of a given country
- Explain the gardening systems of selected cultures

II. Global Marketing Systems:

- Explain the international marketing system
- Explain the operation of a local "farmers market" in selected countries
- Explain the relationship between production and marketing of food products of a given country
- Explain the relationship between agribusiness management practices and cultural practices →

- Describe the impact of transportation systems on agricultural marketing in developed and less developed countries
- Describe the impact of fertilizers and insecticides on agricultural production
- Explain the influence of culture on sales techniques and protocol in the agricultural industry
- Identify the demand for agricultural products among local communities of a given country
- Chart demand and supply of major agricultural products of selected countries
- Explain the role of "middlemen" in the marketing of agricultural products in selected countries
- Compare and contrast the marketing system of the USA and at least one other country
- Discuss the seed marketing system of a given country
- Explain the impact of government policy on production and marketing of various commodities in selected countries
- Compare and contrast U.S. measuring systems with metric system

III. Global Trading Systems:

- Define Gross National Product
- List the agricultural exports of USA to selected countries
- List the largest exporters of major cereals of the world
- List the largest meat exporters of the world
- List the largest vegetable oil exporters of the world
- Identify the largest producer and exporter of sugar
- Compare and contrast the trade policies of the USA and at least one country
- Explain the trade relationship of at least one country with the USA
- Identify the monetary systems of selected countries
- Explain the impact of one monetary system and another
- Identify vegetables that are grown in one country and shipped to another
- Explain U.S. government policy on trade of agricultural products with other countries
- Explain selected countries' trade policies (i.e., Japan, European Common Market)
- Identify trends in world food trade
- List the plantation crops that earn foreign exchange in a given country

IV. Global Food Products, Processing, and Consumption Systems:

- Trace a food commodity produced in one country to its eventual consumption in another
- Explain the food processing techniques used in selected countries
- Describe food storage techniques in selected countries
- Explain the relationship between food production and nutrition in selected countries
- List the nutritive value of selected cereals, legumes, and vegetables grown in a given country

- List the nutritive value of selected fruits grown in a given country
- Explain the comparative preparation of fruits, nuts, and vegetables for storage and distribution in selected countries
- Explain food policy in USA and selected countries
- Compare food policy in USA and selected countries
- List major sources of energy-based foods of the developing countries
- List major sources of protein-based foods of the developing countries
- Define the term "malnutrition"
- List five countries that have the highest rates of people who suffer from malnutrition in the world
- Identify food preservation techniques in a given country
- Define the term "food security" and its relevance to developing countries

V. Global Resource Management Systems:

- Compare and contrast tropical soils to temperate region soils
- Identify the soil classification systems of a given country
- Identify soil conservation practices used in selected countries
- Explain the importance of renewable and non-renewable resources of the world
- Explain the relationship between the available "gene pool" and history of crop plants and animals
- Enumerate major natural resource management problems in developing countries
- Identify and explain water use and management in selected countries
- List the wild-life resources of selected countries
- Discuss the role of trees in the life of rural people in a given country
- List some marine resources of Pacific countries
- Discuss the impact of Green Revolution agriculture on natural resource management in some Asian countries
- Explain slash and burn agricultural systems
- Explain alley cropping systems

VI. Socio-cultural Impacts of International Agriculture:

- Define indigenous knowledge systems
- Explain the relationship between food production and local cultural conditions
- Explain the impact of language of a country on agricultural systems
- Explain the linkages between culture and diet
- Explain the linkages between religion and diet floriculture related to the culture in selected countries
- Explain the impact of land tenure systems on agricultural productivity
- Discuss the relationship between farming community and farm labor community in a given country
- Describe the importance of selected food products on the world cultural experience

Explain the interdependency of agriculture and all other aspects of life

Discuss the interactions between urban and rural communities of a given country

Identify social activities of rural people of a selected country

Describe the role of children in farming in selected countries

Describe the role of women in agriculture in selected countries

VII. World Geography

Locate on a map each of the major continents of the world

Locate on a map each of the major agricultural regions of the world

Identify the livestock grown in each of the major regions of the world

List five of the longest rivers in the world

List five of the largest mountains in the world

Name the highest mountain in the world

Identify the crops grown in each of the continents of the world

Conclusion

There can be no doubt that a truly up-to-date agriculture program must have some international dimension. What is it in your program that has helped students capture the international perspective of agriculture? Which of these learning outcomes will be used in your program?

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Assistantships and Fellowships

(Continued from page 16)

Graduate School; April 15; Director of Graduate Studies; Department of Vocational and Technical Education Building, University of Minnesota, 1954 Buford Avenue, St. Paul, Minnesota 55108, telephone (612) 624-2258.

Mississippi State University

Research Assistantships (2); 9 months; July or August; \$600; tuition waived; masters; March 1; Head, Department of Agricultural Education and Experimental Statistics, Box 9731, Mississippi State University, Mississippi 39762-5546, telephone (601) 325-3326.

University of Missouri - Columbia

Research Assistantships (2); 9-12 months; July and September 1; 20 hours/week; \$750 per month; fees waived; doctoral; May 1, Robert J. Birkenholz, Agricultural Education, 121 Gentry Hall, University of Missouri-Columbia, Columbia, Missouri 65211.

Teaching Assistantships (1); 9 months; August 20, 20 hours/week; \$750 per month; fees waived; doctoral; May 1, contact same as above.

Montana State University

Graduate Teaching Assistantships (2); 9 months from August 15 through June 15; 12 hours/week; \$500 to \$700 per month plus tuition fee waiver; master's candidate; grant budget appointment and/or department budget appointment; April 1 or until filled; contact Doug Polette, Head, Department of Agricultural and Technology Education, Montana State University, Bozeman, Montana 69717-0374; telephone (406) 994-3201.

University of Nebraska

Graduate Teaching Assistant/Graduate Research Assistant (1); 9-12 months; July 1; 20 hours/week; \$500 - 700 per month plus remission of tuition; master's candidate; department budget appointment; April 1 or until filled; Allen G. Blezek, telephone (402) 472-2807.

Graduate Project Assistant (1); 9-12 months; July 1; 20 hours/week; \$500 - 700 per month plus remission of tuition; master's or doctoral candidate; grant budget appointment and/or department budget appointment; April 1 or until filled; contact same as above.

New Mexico State University

Graduate Teaching Assistantships (2); 9 months; August 1; 20 hours/week; \$8,700 per year; February 15 for fall appointments; December 1 for spring appointments; Dr. Miley Gonzalez, Department Head, Agricultural and Extension Education, P.O. Box 30003, Dept. 3501, Las Cruces, New Mexico 88003, telephone (505) 646-4511.

The Ohio State University

Teaching Associateships (2); 12 months; July or later; one-half time; \$1,000 per month; in- and out-of state fees waived; doctoral; February 1; Dr. Kirby Barrick, Chair, Department of Agricultural Education, The Ohio State University, Agricultural Administration Building, 2120 Fyffe Road, Columbus, Ohio 43210-1067, telephone (614) 292-6321.

Research Associateships (4-6); 9-12 months; July or later; one-half time; \$840 - 1,000 per month; master's or doctoral; February 1; contact same as above.

Administrative Associateships (2-3) with emphasis in Extension Education (same as above).

Teaching Associateship (1); 12 months; July or later; one-half time; \$1,000 per month; in- and out-of-state fees waived; doctoral; March 1; Dr. Joe Gliem, Department of Agricultural Engineering, 590 Woody Hayes Drive, Columbus, Ohio 43210, telephone (614) 292-9356.

Research Associateships (3-6); 9-12 months; July or later; one-half time; \$750 - 845 per month; in- and out-of-state fees waived; master's or doctoral; February 1; Dr. Ray Ryan, Center on Education and Training for Employment, 1960 Kenny Road, Columbus, Ohio 43210, telephone (614) 292-4353.

The Pennsylvania State University

Teaching and Research Assistantships in Agricultural →

Education and Extension Education (15); 12 months; starting August 20; 20 hours/week; \$4800 per semester; remission of fees; out-of-state; master's and doctoral; applications are due February 1; Dr. Katherine Fennelly, Head, Department of Agricultural and Extension Education, 323 Agricultural Administration Building, University Park, Pennsylvania; telephone (814) 865-1688.

Purdue University

Teaching Assistantships (1); 10 months; August; one-half time; \$840 per month; tuition and fee waiver; doctoral or master's; February 1; Dr. Jerry L. Peters, Head, Agricultural Education, 1442 Liberal Arts and Education Building, Room 6164, Purdue University, West Lafayette, IN 47907-1442; telephone (317) 494-7290.

Research Assistantships (2-4); 10-12 months; August; one-half time; \$840 per month; tuition and fee waiver; doctoral or master's; February 1; contact same as above.

East Texas State University

Graduate Assistantships (1-3); 9-12 months; July or later; 20 hours/week; \$6,250 for 9 months or \$8,300 for 12 months; waive out-of-state tuition; Master's candidate in Agricultural Education, Horticulture and/or Animal Science; contact Dr. Larry J. Klingbeil, Department of Agricultural Sciences, East Texas State University, Commerce, Texas 75429, telephone (903) 886-5379, FAX (903) 886-5990.

Southwest Texas State University

Graduate Scholarships (2); 12 months; September 1 - August 31; begin at variable semesters depending on need; 12 semester hours of enrollment required; remuneration paid at rate of approximately \$3,000 each semester (2) and \$900 each summer session (2), paid 1st week of each semester (2) and \$900 each summer session (2), paid 1st week of each semester, out-of-state tuition waived; master of Education in agricultural Education (thesis optional); source of funds is Houston Livestock Show and Rodeo Graduate Fellowship; Application deadline, April 1.

Graduate Teaching/Laboratory Assistants (2); areas of expertise preferably in ag mechanics, computers; 20 hours per week plus 12 hours of enrollment; remuneration (negotiable) paid monthly; Master of Education in agricultural Education, (thesis optional); University Funding; Application deadline, April 1.

Contact Dr. Bob Davis, Chairman; Dr. Lon Shell, Agricultural Mechanics & Teacher Educator; Dr. Tom Grady, Head Teacher Educator, Department of Agriculture, Southwest

Texas State University, San Marcos, Texas 7866; telephone (512) 245-2130.

Texas A&M University

Assistantships: teaching (4), non-teaching (6), research (2); 9-12 months; generally July 15 or September 1 or January 15; 20 hours/week; \$900 - 1,000 per month for doctoral; \$600 - 650 per month for master's; out-of-state tuition waived for teaching or research assistantships; public (state) and private; April 1 for September appointment; Dr. Don R. Herring, Graduate Coordinator, Department of Agricultural Education, College of Agriculture and Life Sciences, Texas A&M University, College Station, Texas 77843-2116, telephone (409) 845-2951.

Fellowships: doctoral (2), master's (2); 12 months; generally September 1 or January 15; 20 hours/week; \$900 - 1,000 per month for doctoral, \$600 - 650 per month for master's; public (state) and private; April 1 for September appointment; contact same as above.

Texas Tech University

Assistantships: teaching (2-4), research (2-4); 9-12 months; generally September 1; 20 hours/week; \$700 - 800 per month; waive non-resident tuition and certain fees; master's doctoral; state and private funding; April 1; Dr. Paul Vaughn, Chairman, Department of Agricultural Education and Communications, College of Agricultural Sciences and Natural Resources, Texas Tech University, P.O. Box 42131, Lubbock, Texas 79409-42131, telephone (806) 742-2816.

Virginia Polytechnic Institute & State University

Graduate Assistants (2); 12 months; July 1; 20 hours/week; \$1,000 - 1,200 per month; one Groseclose Fellowship available for summer which pays \$2,000 for a 30 day internship at the National FFA Archives; master's or advanced degree; March 1; contact Dr. John Hillison, Agricultural Education, 284 Litton Reaves, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-0343, telephone (703) 231-8187, FAX (703) 231-6741.

University of Wisconsin - River Falls

Graduate Assistantships (1-2); 9 months; September; 15-20 hours/week; \$580 - 620 per month; remission of out-of-state fees; master's; state funding; April 1; Dr. Richard A. Jensen, Chair, Department of Agricultural Education, University of Wisconsin - River Falls, River Falls, Wisconsin 54022, telephone (715) 425-3555.

Teaching Tips - Improving Your Teaching: Varying Levels of Questioning



BY WILLIAM G. CAMP

Dr. Camp is professor of agricultural education at Virginia Tech, Blacksburg, VA

Good questioning techniques are very important in teaching. Effective teachers use questioning to help motivate students to pay more attention in class and to remember information better. Questioning can be used to cause students to reason through problems and to put pieces of information together in new ways. Callahan and Clarke (1988) argued that questioning is "the key technique" involved in most teaching. In fact, if one uses problem solving in teaching, as described by Crunkilton and Krebs (1982) or by Newcomb, McCracken, and Warmbrod (1986), questions form the structure of the lesson plan itself and are central in the delivery of instruction.

Levels of Questions

According to Crunkilton and Krebs (1982), there are four levels of questions: recall, comprehension, analysis, and evaluation. Callahan and Clarke (1988) use the terms cognitive memory, convergent, divergent, and evaluative questions, but they mean the same thing. The level of the question is determined by what you are trying to get the student to do.

Recall (Cognitive Memory)

The simplest and probably most frequently asked questions are at the recall level. These are questions that have a simple answer which the student is expected to know. Recall questions are used to determine the student's knowledge about factual information. Some examples of recall questions are:

- What is the FFA Motto?
- Who is Dr. Larry Case?
- When should you prune apple trees?
- Where is the fire extinguisher located in the mechanics lab?

Comprehension (Convergent)

Questions that ask students to explain, interpret, give examples, or summarize concepts in their own words are at the comprehension level. These kinds of questions are designed to indicate the student's understanding of a subject. This is also called convergent thinking because it leads students to think more deeply on a subject about which they already have some knowledge. Examples of comprehension

questions are:

- How does prescribed burning reduce the risk of wildfires?
- Why is aquaculture becoming more important today?
- What are some benefits of hydroponic food production?
- What are some foundation shrubs that would work in this situation?

Analysis (Divergent)

Analysis questions require students to apply principles in new settings. This could also be called divergent thinking because it takes the student into new territory -- it requires the student to take existing knowledge and synthesize new knowledge. Problem solving and decision making require this kind of thinking. Analysis questions can also be used to get at the student's underlying assumptions and beliefs about a topic. Examples of analysis questions include:

- What is likely to happen if we set the spark plug gap at .28" instead of .30" as the manual recommends?
- Can we increase our net profit by purchasing a computer?
- Why do you suppose the animal rights movement is becoming so powerful in this country?
- What U.S. farm problems might result from the Gulf War?

Evaluation (Evaluative)

Evaluation questions require students to make a value judgement, to express opinions, to provide a criticism, or to raise their own questions. They require the highest form of thinking; there are no right or wrong answers to evaluative questions. Examples include:

- Do you oppose (or favor) gun control?
- Should the deer population in this state be controlled by game and fish biologists, or is that a question that should be left up to nature?
- Do you believe that FFA membership should be required of all students in our agriculture classes?
- Which breed makes the best beef steer? →

Improving Your Questions

All teachers, including agriculture teachers, have a tendency to use too many recall questions because they are easy to ask and easy to answer. It is also easy to know when the answers are right or wrong. Unfortunately, recall questions do not challenge the student's ability to think, only to remember. On the other extreme, evaluative questions don't really require the student to know anything, only to have an opinion. Evaluative questions can sometimes lead to rambling discussions without much real learning taking place. In the middle ground, comprehension and analysis questions can be difficult for students to answer and can cause frustration both on the student and teacher's parts.

Recall questions are used to reinforce learning and to check on student retention. Comprehension questions cause students to think about what they are learning and allow the teacher to gauge student understanding. Analysis questions make the student think and apply learning in new ways and allow the teacher to determine whether generalizations are being made. Evaluation questions cause students to balance their new learning against their other beliefs and value system and allow the teacher to get a feel for what the students are thinking.

Many teachers question whether their students can think effectively. Rest assured they can, and do. In fact, youngsters think through problems and make decisions constantly even if their teachers do not recognize it. They operate at all four levels every time the counter clerk at

McDonald's asks, "May I take your order, please?"

Conclusion

So, what is the answer? Effective teachers make it a point to use all four levels of questions in almost every class. They plan the questions just as they plan the content and activities in each class. Their lesson plans are not simple topic outlines of information. They are action plans that include content, teaching techniques, student activities, and planned questions to ask (at all four levels).

But, the use of effective questioning should be taken one step farther. If students are encouraged to recall, comprehend, analyze, and evaluate in class, they should be asked to do the same thing at test time. Examinations should contain questions at all four levels, too.

It is high time that we, as teachers, place as many intellectual demands on our students as the counter clerk at a fast food restaurant. The appropriate use of questioning at all four levels, both in class and on tests, is indeed an essential part of effective teaching.

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- Callahan, J.F. & Clark, L.H. (1988). *Teaching in the middle and secondary schools*, 3rd ed. New York: Macmillan Publishing Company.
- Crunkilton, J.R. & Krebs, A.H. (1982). *Teaching agriculture through problem solving*. Danville, IL: The Interstate Printers & Publishers, Inc.
- Newcomb, L.H., McCracken, J.D., & Warmbrod, J.R. (1986). *Methods of teaching agriculture*. Danville, IL: The Interstate Printers & Publishers, Inc.

The Agricultural Education Magazine 1994 Themes

Issue/Theme	Due to Theme Editor	Theme Editor
March <i>Decisions and Dollars: The New Financial Records and Management Information Curriculum</i>	December 1, 1993	Dr. Jack Elliott Dept. of Ag Education College of Agriculture University of Arizona Tucson, AZ 85721
April <i>Land Laboratories</i>	January 1, 1994	Dr. David Whaley Agricultural Education School of Occup. & Educ. Studies Colorado State University Fort Collins, CO 80523
May <i>Teaming Up with CES</i>	February 1, 1994	Dr. Julia Gammon Ag Education & Studies Iowa State University 201 Curtiss Hall Ames, IA 50011
June <i>Supporting Professional Diversity</i>	March 1, 1994	Dr. Eddie Moore Dept. of Ag & Ext. Education Michigan State University 410 Agriculture Hall East Lansing, MI 48824-1039
July <i>Innovative Curricula</i>	April 1, 1994	Dr. David Coffey Ag Science and Tech Education Dept. of Agriculture Western Kentucky University Bowling Green, KY 42101

Implementation Strategies . . .

(Continued from page 12)

Due to the diversity of programs in the secondary schools, each agreement is different, with a total of 10 different courses being eligible for articulation.

Formal agreements have been established to articulate agricultural course work from SFCC to three universities in Missouri (a fourth university has an informal agreement). The agricultural credit allowable for transfer ranges from 18 to 37 hours. This has allowed HOMTEC to have 2 + 2 + 2 articulation agreements in agricultural education between the secondary, postsecondary, and university levels.

Technical content in the secondary programs can be upgraded because Tech Prep students will have better academic preparation. It is expected that students will require less time for the teaching of academic concepts and remedial work. As secondary teachers work with articulation committees, they need to identify additional skills that may be taught in secondary programs.

Postsecondary programs will have the benefit of better academically prepared students who also have a foundation in introductory courses due to articulation. This will provide for the development of more advanced courses which include more technical skills for AAS graduates.

Agricultural educators who are not currently involved in a Tech Prep consortium should consider the benefits. Many students entering secondary and postsecondary agriculture programs will benefit from the positive effects of Tech Prep. Tech Prep is a national initiative that involves 850 consortiums and well over 5,000 school districts in America. Tech Prep places higher expectations on secondary students through rigorous academic and applied courses. Today's students are tomorrow's work force who must be prepared to function in a more highly technical environment. Agricultural education through the Tech Prep framework can help insure that agriculture students are ready for the challenge which lies before them.

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- Edling, W. (1992). *Creating a tech prep curriculum*. Waco, TX: Center for Occupational Research and Development.
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Tech Prep: A Flood . . .

(Continued from page 9)

theoretical design and the actual operation of today's equipment. The Tech Prep program, with an emphasis on agricultural applications, prepares students who can analyze, diagnose, problem solve, and apply. These students are in demand! Agricultural education has a golden opportunity to prepare these young people. As Abraham Lincoln said, their chance will come.

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Systemic Curriculum Model for Agricultural Education

