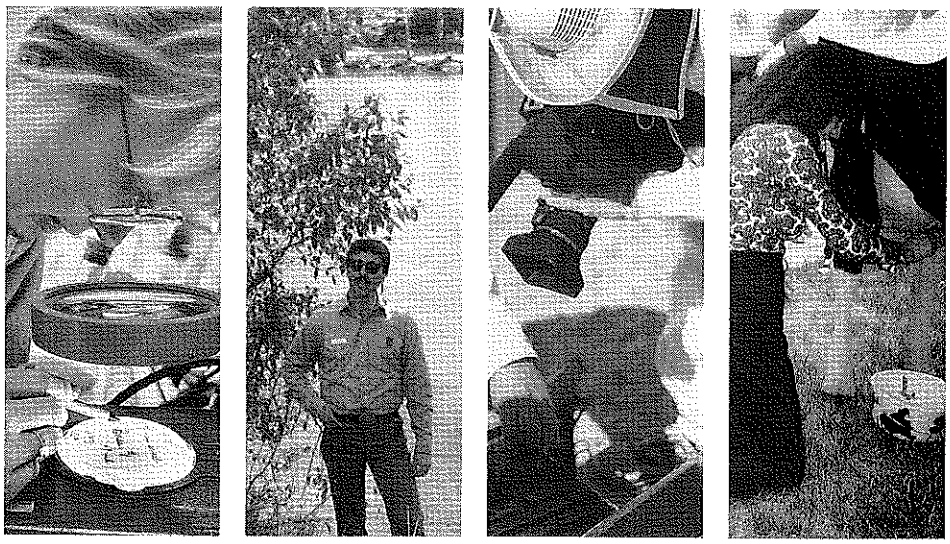
the magazine **Agricultural Education**

July, 1996
Volume 69, Number 1

TECH PREP



A Catalyst for Change

THE
AGRICULTURAL EDUCATION
MAGAZINE

July, 1996 Volume 69 Number 1

Table of Contents

ARTICLE SUBMISSION

Articles and photographs should be submitted to the Editor, Regional Editors, or Special Editors. Items to be considered for publication should be submitted at least 90 days prior to the date of issue intended for the article or photograph. All submissions will be acknowledged by the Editor. No items are returned unless accompanied by a written request. Articles should be typed, double-spaced, and include information about the author(s). Two copies of articles should be submitted. A recent photograph should accompany the article unless one is on file with the Editor.

PUBLICATION INFORMATION

The Agricultural Education Magazine (ISSM 7324677) is the monthly professional journal of agricultural education. The journal is published by The Agricultural Education Magazine, Inc., and is printed at M & D Printing, 616 Second Street, Henry, IL 61537.

Periodicals postage paid at Mechanicsville, VA 23111; additional entry at Henry, IL 61537.

POSTMASTERS: Send Form 3579 to Glenn A. Anderson, Business Manager, 10171 Suzanne Rd., Mechanicsville, VA 23111.

SUBSCRIPTIONS

Subscription prices for The Agricultural Education Magazine are $10 per year. Foreign subscriptions are $20 (U.S. currency) per year for surface mail, and $40 (U.S. currency) foreign airmail (except Canada). Student subscriptions in groups (one address) are $5 for eight issues and $6 for twelve issues. Single copies and back issues less than ten years old are available at $1 each ($2.00 foreign mail). All back issues are available on microfilm from Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106. In submitting subscription, designate new or renewal and address including ZIP code. Send all subscriptions and requests for hardcopy back issues to the Business Manager: Glenn A. Anderson, Business Manager, 10171 Suzanne Rd., Mechanicsville, VA 23111. Publication No. 737246.

Tech Prep a Catalyst for Change

BY WAYNE L. RUSH
Mr. Rush is the state coordinator for tech prep at the Idaho State Division of Vocational Education, Boise.

Tech Prep is starting to make sense to agricultural educators. Many are seeing its potential for becoming a catalyst for significant educational reform. It can provide the framework for enhancing existing vocational programs—expanding their scope, rigor, and outcomes. Tech Prep can also improve the legitimacy of agricultural programs in the eyes of parents, school administrators, and the community. Some, to be sure, are waiting for Tech Prep to go away as another fad of education. However, in the following pages you will read how Tech Prep is being used to transform agriculture education programs across America.

Education in America was established during different times. Only the brightest and best needed to go on to college: the rest could go to work in the factories. Employees needed to show up on time, work hard, and do what they were told. It was best if they didn't think much. The world has changed.

In the Fortune magazine cover story "The New Worker Elite," Louis S. Richman stated, "Since 1950 the number of technical workers has increased nearly 300%—Triple the growth rate for the work force as a whole—to some 20 million. With one out of every four new jobs going to a technical worker, the Bureau of Labor Statistics forecasts that this army of techno-competents—already the largest broad occupational category in the U.S.—will represent a fifth of total employment within a decade" (Richman, 1994, p 56). The number of jobs that require a baccalaureate degree has changed little since 1950, holding around 20%. During the same time, the jobs for the technically trained moved from about 20% to about 65% of the total job market (Hull, 1995, pp. 15-16).

The need for technical workers is creating opportunities for agricultural education and other vocational programs. Preparing these new technical workers will require a change in the emphasis of much of vocational education. Instead of training in high school for an entry level occupation, many programs must look to prepare students for clusters of occupations which require education beyond high school.

The hard and most critical part of the Tech Prep movement is reaching beyond what we thought was our part in education. America is filled with quality agricultural programs. However, in this new world, connections are the critical pieces. We must blend academic education with vocational education, high school with post-secondary education, career guidance with the curriculum, and businesses with education. No longer can a quality educational program stand alone.

To accomplish the task of restructuring America's educational system we will need an effort that is much like developing a world class workplace: a flexible environment, focused on quality, requiring the active participation of people in cooperative work teams. It will take more than just improving an agriculture program in a high school to improving all of high school education.

First, we must eliminate the general educational track. Once adequate for general skills preparation, this track has not kept up - imprisoning students in a mediocre system with no goals, low expectations, and poor outcomes. The old adage that if you aim at nothing, you will hit it every time has come true with the general track. This education has lost its purpose and produces students without the abilities needed to compete in today's marketplace. Much of what we are doing in our current educational structure is sorting students into three categories: college prep, general track, and vocational education. As Patricia Cross put it, "The tough problem is not in identifying winners: it is in making winners out of ordinary people. That, after all, is the overwhelming purpose of education. Yet historically, in most of the periods emphasizing excellence, education has reverted to selecting winners rather than creating them." (cited in Hull and Parnell, 1991, pp. 7-8)

Eliminating the general track is not enough. We have to replace it with a new framework. College prep has long provided students with a focus for their secondary education - preparation for college. Vocational education and especially agricultural education have excelled in creating a hands-on, focused learning environment. Focusing education around Career →

Pathways (or clusters), Tech Prep combines the best of both types of education.

It has been best for us in Idaho to break down Tech Prep into two major components. The first is the framework of (1) career pathways. This component involves organizing courses around broad career areas instead of departments, linking education and careers, integration of academics and vocational education, career guidance, and linking educational levels. Each of these pathways has all the exit points available to students: work after high school, certificates, associate, baccalaureate, and advanced degrees. As students refine their career and educational plans, they are then able to select the second component, (2) specific Tech Prep programs that include at least two years of high school and two years of college.

Career pathways are a meaningful organizational tool for schools and students. They move schools from an unfocused general track of education to broad avenues that put a framework around education. This framework helps schools to organize teachers into cross curricular pathways (they do not need to eliminate the subject level department), organize courses, integrate curriculums, connect guidance to the curriculum, and connect levels of education.

Agricultural education has a critical and expanded part to play in this new structure. Both in providing quality education in pathways like natural resources and in providing the specific technical training that is linked with two-year and four-year colleges.

Tech Prep is unique in that it absolutely requires the cooperation of groups that have not had to work together in the past. These include academic and vocational teachers, post-secondary and secondary teachers, and post-secondary and secondary administrators. One of the problems with restructuring is that many are bringing their agendas under Tech Prep, but are not willing to give up their own little worlds. Post-secondary instructors say, "Tech Prep will sure change secondary education. But it won't affect what we do here." Vocational educators are happy to see more integration of occupational content in academic education, but often are not willing to add academic rigor to their own curriculum. Tech Prep is not a program to bring more students into vocational agriculture, or to provide a feeder for post-secondary schools, or just another way to bring more funding into education. Tech Prep requires significant changes in the way teachers at all levels work together to teach students.

Many of us will have to apply "square wheel thinking"—challenging even the most basic assumptions upon which rules are based—in order to develop creative educational environments that will provide a focused education for all students. In order to facilitate square wheel thinking, education must look beyond the current system to the customers of that system. Business and industry are customers that require a quality product. These customers must be listened to in a new way. Advisory committees have been around for a long time—often as a cheering section for vocational programs. The elimination of the general track and a true integration of academic and vocational and secondary and post-secondary education will require a new way of communicating with business and industry. Business must be asked to provide more specific information about what students need to know. Math, science, communication, and occupational skills will have to be evaluated. Integration will demand that communication with business and industry will no longer be limited to vocational education, but must include all aspects of the curriculum.

This issue of The Agriculture Education Magazine explores how people are using Tech Prep as a catalyst for change. At the center of this magazine is an eight-page pull out showing the concept of career pathways and how schools might organize courses. As you read the articles from Wisconsin, you will also see Career Pathways woven throughout the process. You will also find information on integration, articulation, and making Tech Prep work within agriculture education.

Restructuring schools is not an easy challenge. Often we have tried to improve programs without looking around and see how we can make connections that will bring about real changes. We often hear that people do not want to change. However, most of us are willing to change when it makes since for us. We just don't want to be changed. The changes we need won't come down from the top. It will happen in each location and classroom as teachers and administrators work together to develop a new structure. ■

References

Hull, D. & Parnell, D. (1991). Tech Prep Associate Degree. Waco, TX: Center for Occupational Research and Development.

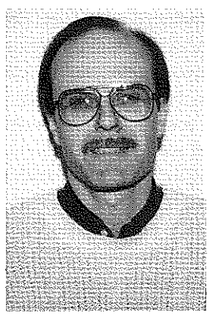
Hull, D. (1993). Opening Minds Opening Doors Waco, TX: Center for Occupational Research and Development.

Richman, L. S., (1994) The New Worker Elite. Fortune August 22, 1994, 56-66.

About the Cover

The cover graphic was created by Chris Latter, Information Specialist, Idaho State Division of Vocational Education.

Tech Prep: A Catalyst for Change



By Gabrielle Banick Wacker with William T. Rockwell and Sharon W. Wendt

Dr. Wacker is a tech prep education consultant and Mr. Rockwell and Ms. Wendt are agricultural education consultants on the Wisonsin Technical College System Board, Madison.

Since 1991, states have implemented Tech Prep. Some focused their efforts on the middle 50 percent of students while others incorporated Tech Prep concepts into the total school curriculum so that all students would benefit. Wisconsin created one of the few statewide comprehensive approaches to Tech Prep that serves all students through systemic reform and system building and helps them transition from secondary to postsecondary education and the workplace. The School-to-Work Opportunities Act (STWOA) legislation was a natural extension of this reform and is built on Wisconsin's strong foundation of Tech Prep.

In a state such as Wisconsin with a history of secondary and postsecondary collaboration, Tech Prep and School-to-Work Transition are a natural extension of collaborative efforts over the past 25 years. Since the mid-1970s, high schools and technical colleges have articulated curriculum through written agreements. In the 1980s vocational education funds were shared between secondary and postsecondary institutions and in the 1990s as Tech Prep was implemented, state legislation strengthened the provisions set forth in the Carl D. Perkins Vocational and Applied Technology Act of 1990 by requiring that:

In cooperation with a vocational, technical and adult education district board, each school district board shall establish a technical preparation program in each public high school located in the school district. (Wisconsin Statutes, 1991-93, 1993-95)

The expectation set forth in state legislation provided the impetus for Tech Prep implementation in all 431 high schools and 16 technical college districts across the state. The partnerships and collaborative activities resulting from Tech Prep are foundational to the state's success in receiving one of the nation's first eight School-to-Work Implementation grants in 1994. The focus on all students and the coordinated state and local framework for meeting students' needs are reasons for this accomplishment. These early coordinated efforts provided an environment for educators and business persons to build a state framework combined with local implementation strategies that together create a model that works for Wisconsin.

Agricultural Education Integral to Tech Prep

Many of the changes caused by Tech Prep are structural changes, such as creating partnerships with business and labor and developing secondary and postsecondary linkages. These changes are key to establishing a coordinated system through which all students can transition and emerge with a clearer career focus and experience curricula related to real-world settings. Wisconsin's strong agricultural education programs have been a source for supporting, testing and refining these changes, especially in career guidance, curriculum alignment and work-based learning.

Agricultural education plays an important role in career guidance by increasing students' awareness of agricultural occupations. Curriculum maps, or pathways, are used in 80 percent of Wisconsin's high schools and although schools may determine particular cluster areas, they typically use six major clusters: Agriculture/Natural Resources; Arts and Communication; Business and Marketing, Health Care; Human Services; and Industrial, Scientific and Engineering. All occupations are included within these clusters, therefore, all students make a tentative career choice in 9th or 10th grade regardless of their employment or postsecondary goal. The Career Majors initiative developing in Wisconsin will enhance curriculum mapping efforts and overall career guidance by helping all students determine a life/work goal.

Agriculture's Emerging Technologies and Tech Prep

In a state where agriculture is the leading force in the economy with $5.4 billion in cash receipts, it is natural to use its necessity and application in our daily lives to capture students' interest. Tech Prep's increased emphasis on providing students with better career information and on helping them make connections between academic and technical subjects are other reasons that more students are considering careers in agriculture. In addition, there are jobs in agriculture and agriculture-related→

fields. Agriculture in Wisconsin directly provides 9.6 percent of all the state's jobs or 213,754 out of the 2.2 million jobs according to a 1990 study (Wisconsin State Journal).

The extensive research and commercial production in biological sciences and its applications to animal health, horticulture, dairy science, crop production, and food science, and research in human and biomedical sciences is creating a prime area for jobs and increasing students' awareness of agriculture in their daily lives. Developing innovative methods and instruments to detect and quantify biochemical reactions is also leading to broader uses of techniques and technologies that cause students to apply their knowledge in a variety of settings.

Biotechnology is an example of a rapidly-growing field that is capturing students' interest at a younger age. Wisconsin is a Midwest center for biotech-related industries that focus primarily on research-to-field applications of biotechnology, particularly seed genetics and bio-enzyme products. This focus on agricultural biotech applications crosses all levels of education and provides a need and an incentive for collaboration. For example, the strength of secondary, technical college and undergraduate programs in biological sciences is creating a demand for biotechnology and molecular biology. The recognition of career opportunities in new areas, as well as broadening career options that overlap other traditional career paths, is expanding the educational offerings in biotechnology into secondary courses that introduce the practical uses and applications of the new technologies.

The modification of corn to become resistant to insect damage, or the use of recombinant DNA techniques to modify a cotton plant that produces naturally brown or green cotton balls, are examples of practical product-based applications that result in expanded and new job opportunities. These and other applications are derived from technologies developed to explore our basic understanding of biology. The transfer of biological technologies from research laboratory to the manufacture of new products, and the modification of existing products, has opened up new opportunities for young people exploring career options. This in turn spurs student interest, motivation and learning in the traditional and applied sciences.

Contributed by Joy A. McMillan. Ms. McMillan is the associate dean of the Madison Area Technical College, Madison, WI.

As career majors are developed we will see students shifting to a clearer career focus while in high school. For that reason, it becomes more critical that curricula encompass developmental guidance concepts and provide students with authentic learning experiences that integrate academic and technical skills.

Curriculum Alignment: A Goal of Tech Prep

Curriculum alignment between secondary and postsecondary education is one of the goals of Tech Prep and School-to-Work. In the early 1980s as national leaders conceptualized Tech Prep, they envisioned a "seamless system" through which students transitioned without delay, duplication or remediation. In some states in the past few years, these original intentions have become convoluted and schools have as their primary goal the awarding of postsecondary credit to students while in high school. Although credit should be granted when credit is due, the practice of awarding credit where there is not complete secondary and postsecondary overlap of competencies will not help students. In some cases this increases the need for remediation at the postsecondary level as students may not have mastered or may not have been taught essential knowledge and skills. In other cases, students may opt to retake courses at the technical college level for which they are eligible to receive advanced standing because time has lapsed between courses and they want to assure their mastery of foundational competencies before preceding to advanced skills. Regardless of the outcome, it is the responsibility of educators to directly align curriculum between levels and then determine if credit arrangements are appropriate based on common competencies. If so, this is a prime opportunity for developing the type of articulation agreements supported through Tech Prep.

In Wisconsin the process of aligning Agricultural education curriculum has maintained the original goal of Tech Prep. Curriculum is directly aligned through curriculum mapping and then credit arrangements are made if deemed appropriate. Through this process, secondary and postsecondary educators have adopted an articulation "attitude" that is exemplified by the "willingness of educators in all sectors to work together to transcend individual and institutional self-interests that impede maximum development of students" (Wendt, 1996). The result is more locally-developed articulation agreements in agriculture and agrelated courses between high schools and technical colleges. These advanced standing agreements are transportable among the state's technical colleges offering comparable courses. A statewide articulation agreement in Livestock and Crop Production areas (see sidebar insert) and state cooperative education skill certificate are also under development. →

Secondary to Postsecondary Articulation in Agriscience

In an effort to extend local articulation agreements in Agriscience and articulate curricula on a statewide basis between high schools, technical colleges and 4-year universities, the Wisconsin Technical College System (WTCS) spearheaded a project to develop a 2+2+2 aligned curriculum and articulation process. The high school articulation was supported through Tech Prep funds jointly administered by the Wisconsin Department of Public Instruction and WTCS. The result of this collaboration is four core introductory technical college courses in Agriscience that will be articulated with high schools through a statewide agreement. Curricula for Introductory Soils and Plant Morphology and Physiology courses were based on the "Developing a Curriculum" process, or DACUM, by business and industry representatives and were disseminated to high school agriculture teachers in June 1995. Five high schools piloted the curricula and provided recommendations on its use. Subsequently, two courses in livestock production were adapted and will be disseminated to high schools. The courses are all included in the Agriculture and Natural Resources cluster, which is one of six career clusters typically used by Wisconsin high schools. These courses will also be used as the basis for a state cooperative skill certificate in Agribusiness Animal Science for secondary students.

As other secondary and postsecondary partners replicate the process of developing courses for articulation, there are several points to keep in mind. Most critical is, since the goal is to articulate secondary and postsecondary curricula, secondary educators must be involved in every step of the process, including planning, writing and piloting curricula and providing feedback for refining the curricula. Other recommendations are to:

(1) Begin with state and national industry skill standards, combine standards with a current industry job analysis by employers statewide to determine competencies and

(2) Determine standardized curriculum content and curriculum format. The Wisconsin Instructional Design System (WIDS) is used to assist educators in all statewide curriculum projects as well as locally developed curriculum. The performance-based instructional design concept and accompanying software tools require educators to continually focus on learners as they write measurable competencies, identify criteria and conditions for assessing competencies and develop learning and teaching activities for instruction. The WIDS framework also provides a common curricular language and framework that facilitates competency comparison through articulation and is used by all 16 technical colleges and more than 156 high schools statewide.

Contributed by Donald M. Jaworski and Kevin Champeau. Mr. Jaworski is the associate dean of Northeast Wisconsin Technical College, Green Bay, WI. Mr. Champeau is the agricultural education teacher at Freedom High School, Freedom, WI.

Through the curriculum articulation process, secondary and technical college educators have learned much about each others' content and instruction. Tech Prep emphasized the teacher-to-teacher interaction necessary for true curriculum alignment and an honest exchange of content that was not present before.

> Prior to Tech Prep, there was an implied conception that many high school instructors were "covering much of the material" that was taught in technical college introductory courses. Educators working together through Tech Prep have helped narrow the gap of ambiguity that often exists between high school and technical college content. Furthermore, by using a common curricular language and framework to write, compare and assess curricula, high school teachers have a clearer understanding of what is expected of students and the level of accepted performance (Wendt, 1996).

Working toward a common curricular language and framework is a challenging task, particularly when format and outcomes differ between secondary and postsecondary education. The WIDS is one approach used across the state that is helping teachers focus on student expectations through performance-based instruction and assessment and a common curricular language that educators on both levels understand. WIDS was used in both Agricultural education curriculum articulation projects to transform the knowledge and skills identified by industry into competencies with learning activities and performance criteria and conditions. Through this process students understand what it is they need to know and be able to do to succeed in the classroom and on the job. Students are also assured that they are learning relevant skills based on industry standards that can be easily communicated and articulated across educational levels. This new methodology and accountability for student learning is gaining momentum as educators enthusiastically embrace performance-based instruction and assessment.

Curriculum alignment is essential to Tech Prep and a benefit to students. As students tran→

sition between institutions, they will do so through a seamless system of directly aligned and articulated courses—either way, they will be prepared for rigorous collegiate work and advanced skill training without delay or duplication of learning.

Work-based Learning Reinforces School-Based Learning

The relationship of classroom knowledge and skills to workplace performance is further reinforced by work-based learning. Tech Prep includes work-based learning as a component, but STWOA emphasizes it's importance in preparing students for the future workplace. Through state support and STWOA resources, Wisconsin has developed state certificated cooperative education and youth apprenticeship work-based learning opportunities in 18 technical areas. Competencies for statewide skill certificates are derived from business and industry and re-validated biannually.

The Cooperative Education Skill Certificate in Agribusiness-Plant Science differs from traditional co-ops in that it includes 80 state certified competencies which have been validated by business and industry with secondary and post secondary educator involvement. Students are expected to meet 90 percent of the competencies in order to receive a state certificate. There is greater emphasis on performance assessment and the implementation requires training of business mentors. Although state skill certificates prescribe the competencies that must be included in Agriscience, they inspire local creativity in meeting those competencies based on unique industry needs and student interests.

In 1995-96, there were 730 youth apprenticeship students and approximately 1200 skill certificated cooperative education students enrolled in Wisconsin high schools. Through STWOA funds, school districts may receive a per pupil incentive of $400 per youth apprenticeship student for completion of a 2-year program and $200 per cooperative education student for a 1-year program.

Opportunities for High School Students: Biotechnology Youth Apprenticeship

Wisconsin's Youth Apprenticeship in Biotechnology is an 11th and 12th grade curriculum that integrates agriculture and biology. The program, now entering its third year of implementation, began in 1994 with industry representatives indentifying a need for students trained in Biotechnology and making a commitment to providing high-quality, paid, work-based learning experiences for students. Currently, there are 27 students enrolled in the program which is supported by two consortia of area high schools, Madison Area Technical College and local employers, including local businesses and the University of Wisconsin-Madison Departments of Horticulture and Bacteriology.

All Youth Apprenticeship curricula are based on statewide skill standards identified by industry task analyses, or DACUMs. The two-year Biotechnology Youth Apprenticeship is based on 64 competencies with accompanying learning activities and performance-based assessemnt criteria. Students must master 92% of the competencies in order to receive a state certificate in Biotechnology. Students are also paid employees of participating business for a minimum of 10-15 hours/week and receive instruction on the job, as well as in school. Articulation agreements help students transition to one of the state's 16 technical colleges offering comparable courses in biology or agriculture. A statewide articulation agreement specifies that students may receive 11 credits upon enrolling in a Wisconsin technical college Biotechnology Lab Technican program.

The support for Biotechnology Youth Apprenticeship students is exceptional. Employers not only provide wages, but time and support through worksite mentors and instructors. They also see the return on their investment and view students as a critical asset to their industry. Karl van Lith, Training and Development Manager, Promega Corporation, Madison, Wisconsin best represents employers' commitment to students in the workplace when he said, "Without their help and input, several product development projects would either have not been accomplished or seriously delayed. The work of the Youth Apprenticeship students was invaluable."

Contributed by Joy A. McMillan and Mark M. Johnson. Ms. McMillan is the associate dean of Madison Area Technical College, Madison, WI, and Mr. Johnson is an education consultant on the Wisconsin Technical College System Board, Madison.

Work-based learning is also a priority at the technical college level where more than half of all associate degree programs have a substantial work-based learning component, such as a co-op, internship or clinical experience. An exemplary model of educator/employer partnership through work-based learning is the "John Deere Ag Tech" program conducted by Madison Area Technical College and John Deere Corporation. Developing highly-skilled technicians for work in John Deere dealerships is the goal of this national program. Several technical college sites across the country combine the resources and expertise of education and industry to provide internships to students that relate classroom instruction and worksite experience. John Deere provides a significant industry contribution through tuition for students, equipment, support manuals and instructor training. Technical colleges provide instructors, laboratory/classrooms and coordinate work-based and school-based instruction. The success of this and other work-based learning programs is that it fills a vital industry need for quality-trained

(Continued on page 19)

CAREER PATHWAYS IDAHO

This article was originally published by the Idaho State Division of Vocational Education, Boise. For more information, contact Wayne Rush, state coordinator for tech prep, Idaho State Division of Vocational Education, P.O. Box 83720, Boise, Idaho, 83720-0095 or by phone at (208) 334-3216.

Career pathways provide school personnel, parents, and students with a new way to look at preparing for the work force and further education. Pathways show the integration of academic and vocational courses, the relationship of school to careers, and the need for further education.

Within each career pathway, students choose or design a career major. Career majors include course work that prepares students to: (1) enter directly into the work force; (2) continue education focused on one- to three-year technical degrees; or (3) pursue baccalaureate degrees. Every student follows an educational plan for their career major.

Students must receive strong career guidance so they can choose a pathway and develop an educational plan. The intent is not for students to decide on a specific occupation for the rest of their lives, but to have them choose a pathway into which they can begin to direct their energies.

Integration of Academic and Vocational Programs

Career pathways make it easier for teachers to work across disciplines.

Career pathways help facilitate integrated curricula. They require both vocational and academic competencies related to occupations. For example, in the Health Services area, students need the academic competencies contained in anatomy and physiology and vocational competencies contained in medical terminology and emergency procedures.

Career pathways help to integrate the curriculum by allowing teachers to work within their own departments and across disciplines to design courses that meet the needs of students. Each career pathway provides teachers a framework for developing and coordinating an integrated curriculum. Material being taught is reinforced in different classes at appropriate times. For example, chemistry teachers can use the laboratory to demonstrate why infection occurs. Health Occupation teachers teach the applications of infection prevention principles when students learn the basic procedures to prevent infection in the Health Occupations program.

Relationship of Education to Work

Career pathways help students, parents, teachers, and counselors see the relationship of education to the world of work. Whether pursuing a four-year degree, a two-year degree or on-the-job training, students follow a career pathway. Each pathway leads to many occupations and suggests the related education and training necessary to prepare for those occupations.

Career pathways help college preparatory students make relevant course selections. A student wishing to become an engineer chooses the Industrial and

Engineering career pathway. Students will take courses to meet college admission requirements. In addition, this pathway allows the engineering student to take courses in computer assisted design, advanced mathematics, and other technical courses beyond college entrance requirements. A student pursuing a career in journalism takes courses available in the Arts & Communications career pathway. All students will master the basic skills required to be successful regardless which career pathway they choose.

Many occupations require work experience before one is considered fully prepared. Work-based learning activities may be (1) exploratory such as job shadowing, short term work experiences and community service, or (2) concentrated technical training such as cooperative education, supervised occupational experience, clinical experiences, school-based enterprises, and individualized occupational training programs. When these activities are incorporated into the curriculum, they complement classroom training by providing related experiences in the world of work.

Each community offers a variety of work-based learning opportunities to meet the career needs and abilities of all young people. Successful work-based learning experiences include:

- Careful planning of what young people will learn and how they will learn it
- Competent supervision, coaching, and mentoring by adults
- Evaluation and documentation of learning
- Opportunities at school and at work for thoughtful reflection on what has happened and what it means
- Multiple connections between school-based and work-based learning
- Work experiences related to the chosen career pathway
- School credit granted for work-based learning
- Parents knowledgeable about both school and work
- Work-sites free of bias and stereotyping

In a pathway, students do not wander through school picking courses based on what is easy or what their friends are taking.

The Need for Advanced Education

Career pathways show the need for and importance of advanced education and training when preparing for the world of work. Pathways not only show the occupations but the corresponding education and training needed to prepare for those occupations. As students move along the pathway, they encounter occupations requiring increased knowledge and skill.

The following pages give examples of six Career Pathways and how schools might organize courses. Each page has suggested courses for a Career Pathway and an example of an individual student's educational plan.

Arts and Communications

Career Pathway

The Arts and Communications career pathway includes programs related to the humanities and to the performing, visual, literary, and media arts. These include architecture, creative writing, film and cinema studies, fine arts, graphic design and production, journalism, foreign languages, radio and television broadcasting, advertising, and public relations.

Recommended Courses for the Arts and Communications Pathway

- **Keyboarding/Intro to Computers** -Recommended for all career pathways
- **English** - Creative Writing, Literature, Journalism, Applied English
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2; Advanced Math Course
- **Science** - Anatomy, Biology, Botany, Chemistry, Applied Physics
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Humanities** - Art, Photography, Drawing & Painting, Graphic Design, Ceramics & Jewelry
- **Foreign Language** - French, German, Spanish, Japanese, Latin
- **Fine Arts** - Theater Arts, Humanities
- **Music** - Band, Choir, Music
- **Business/Marketing** - Computers, Accounting, Business Law, Financial Management
- **Family and Consumer Sciences** - Apparel & Housing, Teen Living, Adult Living, Career & Personal Development, Fashion Merchandising
- **Agriculture** - Landscaping, Horticulture
- **Technology** - Computer Aided Drafting, Communication Technology, Printing and Graphic Arts
- **Work-based Learning** - Community opportunities in the arts or graphic communications

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

Teachers organize themselves into pathways instead of just discipline departments.

Identifying a career pathway can help students select courses, activities, and part-time employment.

■ Working within one or more career pathways, students can develop an educational plan. **Here is one example.**

Career Goal — Graphic Design

Year 9:	**Year 10:**
Career and Personal Development	Drafting/CAD
English I	Technical Writing
Reading & Speech	Applied Math II
Art I	Art II
Principles of Technology	Health/Physical Education
Applied Math I	Social Studies
Year 11:	**Year 12:**
Algebra II	Printing & Graphics
Biology	Journalism/Literature
Creative Writing	Foreign Language
Foreign Language	Photography
Graphic Design	American Government
US History	Media Production

Beyond High School — Graphic Design course of study

Business and Management

Career Pathway

The Business and Management career pathway includes programs related to the business environment. These may include entrepreneurship, sales, marketing, hospitality and tourism, computer/information systems, finance, accounting, personnel, economics, and management.

Recommended courses in the Business and Management Pathway

- **Keyboarding/Intro to Computers** - Recommended for all career pathways
- **English** - Creative Writing, Literature, Journalism, Business Writing, Applied English
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2; Business Math
- **Science** - Anatomy, Biology, Botany, Chemistry, Applied Physics
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Business** - Computers, Accounting, Business Law, Financial Management
- **Marketing/Management** - Marketing, Business Management
- **Family and Consumer Sciences** - Food Service and Hospitality Management, Career & Personal Development, Personal & Family Finance/Consumer Economics
- **Agriculture** - Agricultural Business and Leadership
- **Work-based Learning** - Cooperative Education and Internships in the areas of Business or Marketing

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

■ Working within one or more career pathways, students can develop an educational plan.
Here is one example.

Career Goal —Accounting

Year 9:	**Year 10:**
Computer Applications	Business Computer Applications
Algebra I	Biology or App. Biology/Chemistry
Earth Science	English II
English I	Humanities Elective
Reading & Speech	Health & Physical Education
Communications Technology	Geometry
Year 11:	**Year 12:**
Computerized Accounting	Business Technology
Algebra II	Chemistry or Physics
Principles of Technology	Applied English
Economics	American Government
English III	Cooperative Education
US History	

Plans Beyond High School: Accounting degree course of study

Students may want to select more than one pathway. For example, a student interested in hospital administration may wish to select courses from both the Business Management and Health Services pathways.

Teachers and administrators can advise students within a pathway. By having teachers and students select a career pathway, teachers can become knowledgeable about careers and help students and parents to develop an educational plan.

Health Services

Career Pathway

The Health Services career pathway includes programs related to the promotion of health as well as the treatment of injuries, conditions, and disease. These may include medicine, dentistry, nursing, therapy and rehabilitation, nutrition, fitness, and hygiene.

Recommended courses for the Health Services Career Pathway

- **Keyboarding/Intro to Computers** - Recommended for all career pathways
- **English** - Creative Writing, Literature, Journalism, Technical Writing
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2; Advanced Math Course
- **Science** - Applied Biology and Chemistry, Principles of Technology, Anatomy and Physiology
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Social Studies** - Sociology, Psychology
- **Health Occupations** - Health Occupations 1, Health Occupations 2
- **Family and Consumer Sciences** - Nutrition & Foods, Family Health & Wellness, Food Science, Career & Personal Development
- **Physical Education** - First Aid
- **Work-based Learning** - Clinical Experiences in the Health Field

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

■ Working within one or more career pathways, students can develop an educational plan.
Here is one example.

Career Goal — Nurse

Year 9:	**Year 10:**
Applied Math I	Exploratory Careers/Health Occupations
Earth Science	Applied Math II
English I	Biology or Applied Biology & Chem.
Reading & Speech	English II
Humanities Elective	Reading & Speech
Economics	Health & Physical Education
Year 11:	**Year 12:**
Health Occupations I	Health Occupations II
Algebra II	Chemistry
Principles of Tech.	Applied English
English III	Humanities Elective
US History	American Government
Sociology	Psychology

Plans Beyond High School -- Health Occupations course of study

By discovering students' dependable strengths, students and parents are able to make informed choices about education.

Printing course offerings by career pathways begins the process of making connections among courses, and between schools and the world of work.

Human Resources

Career Pathway

The Human Resources career pathway includes programs related to economic, political, and social systems. These may include education, law and legal studies, law enforcement, public administration, child and family services, religion, and social services.

When school personnel return to industry, they often find how important what they are teaching is to the success of students when those students enter the world of work. Having teachers return to an industry in their pathway is an excellent inservice activity.

Recommended Courses for the Human Resources Pathway

- **Keyboarding/Introduction to Computers** - Recommended for all career pathways
- **English** - Creative Writing, Literature, Journalism, Applied English
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2, Advanced Math Course
- **Science** - Applied Biology and Chemistry, Principles of Technology, Anatomy and Physiology
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Family and Consumer Sciences** - Child Development, Food Service & Hospitality Management, Occupational Child & Adult Care, Apparel & Housing, Nutrition & Foods, Teen Living, Adult Living, Career & Personal Development, Personal & Family Finance/Consumer Economics, Family Health & Wellness
- **Health Occupations** - Health Occupations 1, Health Occupations 2
- **Humanities** - Art, Photography, Drawing & Painting, Graphic Design, Ceramics & Jewelry
- **Social Studies** - Psychology, History, Government, Geography
- **Work-based Learning** - Cooperative Education in the Field of Human Services

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

Pathways provide direction not tracking. Students should explore options and change pathways whenever they find one better suited to their strengths and interests.

■ Working within one or more career pathways, students can develop an educational plan.
Here is one example.

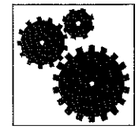
Career Goal — Child Life Specialists

Year 9:	Year 10:
Career & Personal Development	Nutrition & Foods or Teen Living
Applied Math I or Algebra I	Applied Math 2 or Algebra 2
Applied Biology & Chemistry	Biology
English 9	English 10
Social Studies	Sociology or Psychology
Elective	Reading & Speech
Year 11:	**Year 12:**
Parenting & Child Development	Occupations Child Care
Algebra II	Advanced Math
Adult Living	Principles of Technology/Chemistry
English 11	English 12 or Applied English
US History	Government
Family Health & Wellness	Cooperative Education

Plans Beyond High School -- Child Development course of study

Industrial & Engineering

Career Pathway



The Industrial and Engineering career pathway includes programs related to the technologies necessary to design, develop, install, or maintain physical systems. These may include engineering and related technologies, mechanics and repair, manufacturing technology, precision production, electronics, and construction.

Recommended courses for the Industrial and Engineering Pathway

- **Keyboarding/Introduction to Computers** - Recommended for all career pathways
- **English** - Technical Writing, Journalism
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2, Advanced Math Course
- **Science** - Applied Biology and Chemistry, Approved Agricultural Science Courses, Chemistry, Biology, Physics
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Family and Consumer Sciences** - Apparel & Housing, Career & Personal Development, Personal & Family Finance/ Consumer Economics, Food Science, Teen Living, Adult Living
- **Trade/Technical** - Principles of Technology, Automotive Technology, Building Trades, Electronics Technology, Drafting, Industrial Mechanics, Printing & Graphic Arts
- **Technological Education** - Communications Technology, Power, Energy and Transportation Technology, Engineering and Design, Construction Technology, Manufacturing Technology.
- **Humanities** - Ceramics & Jewelry
- **Agriculture** - Small Gas Engines, Welding Technology
- **Business and Marketing** - Computers, Accounting, Business Law, Marketing
- **Work-based Learning** - Cooperative Education in Industrial or Engineering Fields, Apprenticeships

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

■ Working within one or more career pathways, students can develop an educational plan.
Here is one example.

Career Goal — Electronics Technician

Year 9:	Year 10:
Introduction to Technology	Power/Energy & Transportation Tech
Applied Math I	Humanities Elective
Earth Science	Applied Math II
English I	Biology or Applied Biology/Chemistry
Reading & Speech	English II
Principles of Technology	Health & Physical Education
Year 11:	**Year 12:**
Principles of Technology	Electronics II Tech.
Algebra II	Intro to Electronic Drafting
English III	Work-based Learning
Intro. to Electronics Tech.	Calculus
US History	Technical Writing
Computer Aided Design	American Government
Chemistry	

Plans Beyond High School -- Electronics course of study

Integration of academic and vocational education makes possible a career pathway connecting education with the world of work.

Pathways show students how education is an important part of preparing for life and work.

Natural Resources

Career Pathway

The Natural Resources career pathway includes programs related to the environment and natural resources. These may include agriculture, earth sciences, environmental sciences, fisheries management, forestry, horticulture, and wildlife management.

Career guidance is a key to helping students make informed choices about career pathways and which courses to select. The Dependable Strengths process will help students discover a pathway.

Recommended Courses for the Natural Resource Pathway

- **Keyboarding/Introduction to Computers** - Recommended for all career pathways
- **English** - Technical Writing, Journalism, Applied English
- **Math** - Applied Math 1 & 2, Algebra 2; or Algebra 1, Geometry, Algebra 2, Advanced Math Course
- **Science** - Applied Biology and Chemistry, Principles of Technology, Anatomy and Physiology, Approved Agriculture Courses
- **Required Courses** - U.S. History, American Government, Economics, Humanities, Physical Education, Health, Speech, Reading
- **Agriculture** - Horticulture, Landscaping, Agriculture Business and Leadership, Livestock Production, Natural Resources Conservation
- **Business/Marketing** - Computers, Accounting, Business Law, Financial Management, Marketing
- **Family and Consumer Sciences** - Parenting and Child Development, Food Service & Hospitality Management, Apparel and Housing, Food Science, Nutrition & Foods
- **Trade/Technical** - Drafting, Mechanics, Welding, Construction Technology
- **Work-based Learning** - Supervised Agricultural Experience Program

(The above courses are examples of what high schools might offer to students within pathways. This listing does not include all required courses. Students must complete all State Board of Education graduation requirements).

Pathways provide a mechanism to eliminate a low level general track that does not prepare students for further education or the world of work.

■ Working within one or more career pathways, students can develop an educational plan.

Here is one example.

Career Goal — Wildlife Specialists

Year 9:	Year 10:
Intro to Agriculture Education	Botany/Plant and Soil Science
Personal Skill Development	Applied Math II
Applied Math I	Biology or Applied Biology/Chemistry
Earth Science	English II
English I	Humanities Elective
Reading & Speech	Health & Physical Education
Year 11:	**Year 12:**
Botany/Horticulture/Plant Science	Zoology/Fish & Wildlife Science
Algebra II	Principles of Technology
Biology	Applied English or English IV
English III	Humanities Elective
Humanities Elective	American Government
US History	Economics

Plans Beyond High School -- Natural Resources Curriculum

Agri Tech Prep 2000 Offers Statewide Program for Students Seeking Careers in Agriculture

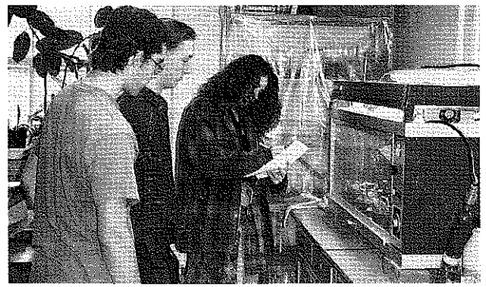
BY TERRY HUGHES

Mr. Hughes is the statewide project coordinator of agri tech prep at Cobleskill College, Cobleskill, NY.

The Agricultural Tech Prep (ATP) 2000 Consortium in New York State has completed five years as a statewide thematic Tech Prep demonstration project. The consortium included 15 educational institutions (12 secondary, 3 post-secondary) which offer comprehensive education programs. The participants agreed to join in a coordinated and articulated four-year program to provide technical preparation for careers in agriculture and natural resources. The project has developed and implemented a comprehensive and consistent, state-wide agricultural curriculum which is also integrated with and reinforces appropriate curricula in mathematics, science, communications, and technology. Project activities included:

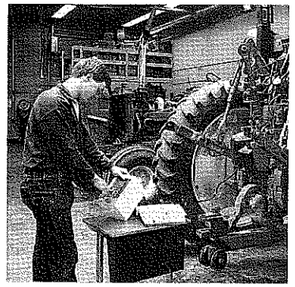
- implementation of articulation agreements
- development of career education components
- instructional materials development joint in-service programs for secondary and post-secondary teachers of agriculture, as well as teachers of core curriculum subjects and guidance counselors
- student recruitment and placement
- portfolio assessment.

The ATP 2000 Project emphasizes education and career preparation for industries in "Agriculture," in the broadest sense of the term, to reflect the actual comprehensive and technological nature of this sector, as well as the comprehensive programs offered in agriculture at the secondary and post-secondary levels. Major program areas include, but are not limited to, agricultural business, agriscience, animal science, aquaculture, equine science and management, plant science and crop production, horticulture (including nursery management, floriculture resources, landscape development, turfgrass management), forestry and renewable resources, environmental science, natural resource management, biotechnology waste management, and agricultural engineering technology. As the project matured, it has embraced the goals contained in the national "Strategic Plan for Agriculture Education," developed by the National Academy of Sciences, the U.S. Department of Education, and the National Council for Agricultural Education in 1989. The first goal of this plan states the need to update instruction in Agriculture and expand programs about agriculture. The ATP 2000 Project has created mechanisms and procedures for students to progress through their secondary education and two years of associate degree education in a planned, sequential, continuous curriculum that includes appropriate levels of preparation and skills in science, mathematics, communications and technologies. In addition, the curriculum allows for a variety of programmatic options as well as a variety of entry and exit points, including articulation to education beyond the associate level. Students from consortium schools completing the secondary curricu- →



Robert Merrill, Jonathan Weaver, and Cheylen Heiman, high school seniors enrolled in the Tech Prep Environmental Science program through the area vocational center and Cobleskill College, are recording data on plants being raised in unique, controlled environments. (Photo courtesy of Terry Hughes.)

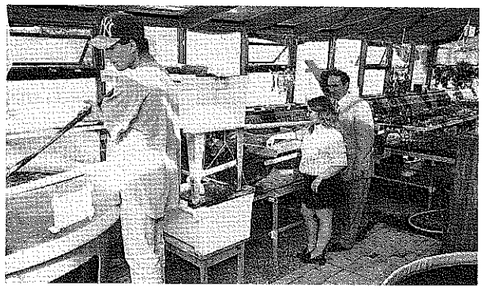
Jim Sill, a senior at Greenville Central High School, explains the process by which a brook trout is raised in a recirculation system. This curriculum was developed and is headed by Dr. John Foster, SUNY Cobleskill Professor of Aquaculture and Fisheries. (Photo courtesy of Terry Hughes.)



Mike Kachmar from Vermont, an Agricultural Engineering - John Deere Ag Tech major at SUNY Cobleskill, is diagnosing fault codes using a dual functioning performance meter. (Photo courtesy of Terry Hughes.)

lum are provided guaranteed entry into an Associate in Applied Science degree program. The portfolio assessment process allows those students who excel to receive college credit that includes both local school and post-secondary evaluation. The portfolio evaluation criteria focuses on foundational skills identified in the U.S. Department of Labor SCANS Report. This process has enhanced students abilities in making the connections between the course work and employability skills. Students are required to analyze their education holistically by identifying what they have learned in math, science, and communications and how it contributes toward their career goals. This has resulted in increasing student success rate upon entry into the post-secondary level, thereby accomplishing another project goal of developing a curriculum that ensures graduates are prepared to enter college work without need for remediation.

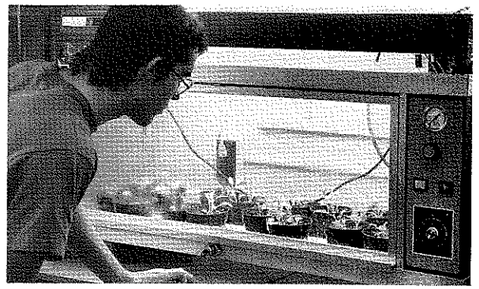
ATP 2000 students entering post-secondary fall 1995, completed their first semester with an average GPA of 2.95 at SUNY Cobleskill. By focusing assessment strategies on student outcomes and competencies, the consortium schools were allowed more flexibility in delivering the curriculum in a method most appropriate to the institution type, whether a local education agency such as a small rural school, a regional technical center, or a comprehensive urban school. One unique delivery system has been a collaborative effort between a regional occupational center and SUNY Cobleskill with high school seniors studying Environmental Science. The students spend half of their day on the college campus. This program is facilitated by a secondary funded instructor, who provides some instruction and also acts as a mentor for college courses students are enrolled in. As a result, students receive up to 17 college credits while completing their high school requirements.



Jim Sill, a senior at Greenville Central high School, is shown here working on the aquaculture recirculation system which is located in the school's greenhouse. Classmate, Janelle Therrien, explains the hydroponics process, which utilizes nutrient rich waste water from the aquatic system to grow flowers and vegetables, to Terry Hughes. (Photo courtesy of Terry Hughes.)

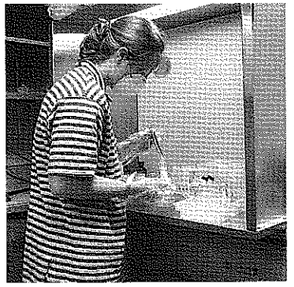
In-service activities, therefore, emphasized not only technical information, but also provided varied teaching methodologies to alter the manner in which teachers deliver the curriculum. Teachers have evaluated the in-service activities over the five year period very positively, indicating the importance of being given the opportunity of sharing successful practices. The primary model utilized post-secondary faculty curriculum team writers who presented successful strategies that have been used in college courses, and through a team process all teachers identified delivery and teaching techniques to be piloted. Each year these were reviewed to complete the curriculum development process.

As the technical information and teaching techniques were being drawn together, one additional step was used to ensure integration of academics in the curriculum. Teams of English, math, and science teachers from secondary and post-secondary schools reviewed each curriculum to identify specific competencies included in the agriculture curriculum that students should develop, recommend additional competencies to be included, and recommend teaching methodology proven to be successful in teaching these competencies. This activity proved to be essential as schools began to request local math and science credit for students enrolled in ATP 2000 modules. By the third year, the majority of the pilot schools had approved local academic credit, and during the fourth year, one school received provisional approval from the New York State Education Department for students to receive academic credit toward the New York State Regents Diploma. This provisional variance for ATP 2000 courses positions agriculture education as a part of the solution to the challenge of increasing standards for secondary students. This direction has proven to be extremely critical to agriculture education in New York as the State Board of Regents has recently approved a plan that will require all students to complete a state level diploma, phasing out the existing local option. School districts in New York State have had the option to provide their own achievement exams and to establish criteria for graduation.



Robert Merrill, a high school senior enrolled in the Tech Prep Environmental Science program through the area vocational center and Cobleskill College, is recording data on plants being raised in unique controlled environments. (Photo courtesy of Terry Hughes.)

The hands-on experiential learning activities incorporated into the ATP 2000 modules have increased student motivation, enhancing students ability to grasp more easily concepts they→ encounter in traditional science and math courses. It has also kindled their interest in pursuing careers in Agriculture and Natural Resources. The modules developed which comprise the ATP 2000 curriculum include Environmental Science, Mechanization Systems and Structures, Plant and Animal Science, Managing an Enterprise, Aquatic Science, and Work Experience. Agriculture educators have commented that the ATP 2000 curriculum development process, coordinated by Cornell University's Instructional Material Service, has directed the future of agriculture education in New York by creating a technologically accurate curriculum with an academic base. The consortium has grown from the original 15 members to over 40 schools throughout the state that are offering Agri Tech Prep courses to students. The ATP 2000 project, as a whole, was described as giving the agriculture program "a shot in the arm" with students and teachers "living the concept", according to a recent project evaluation completed through a sub contract with the Agriculture Education Department at Cornell University. Within individual schools, participants mentioned that guidance counselors, parents, and academic teachers perceived the rigor and level of agriscience programs to be enhanced. In particular, the Environmental Science and Aquatic Science curricula were frequently described as "revamping my agriculture courses" and "re-energizing both myself and my students." One school increased its enrollment in one or more of the ATP 2000 courses from 30 students to 110 students per year. Nearly every program indicated that students from other curriculums who normally would not choose to enroll in a traditional agriculture course had enrolled in ATP 2000 courses.



Suzane Conlon, a junior at Greenville Central School, is shown transferring carrot callus into shoot inducing media as a part of her biotechnology laboratory work in the ATP 2000 plant science curriculum. (Photo courtesy of Terry Hughes.)

As the consortium has expanded, secondary programs from neighboring states have expressed interest in pursuing articulation agreements with post-secondary institutions. To date, one such agreement has resulted with the Southwest Career Development Center in Bennington, Vermont, allowing students to receive college credit in Plant Science curriculums by completing the articulated secondary curriculum. The project continues to work on articulation agreements with schools which have been used by secondary teachers to enhance local agriculture program credibility with parents, educators, guidance counselors and college-bound students. As a result, post-secondary agriculture enrollment has experienced an increase which will provide the New York State agriculture and natural resource industry with a work force competent to adapt to the changing needs they will face in the 21st Century. ■

Tech Prep: A Catalyst for Change

(Continued from page 8)

technicians who are job-ready at employment due to strong connections between education and employers.

Tech Prep and Agricultural education: A Winning Combination

Tech Prep in Wisconsin and other states has been a catalyst for change. This article highlights several applications of Tech Prep concepts to Agricultural education. Other disciplines will have similar applications, however, Wisconsin's Agricultural education program provides a rich arena for implementing the curricular and philosophical changes called for in Tech Prep. This optimum environment for change is enhanced by the diverse and dynamic nature of Agricultural education that is contextualized in our daily lives. Increasingly, students are realizing the importance of agriculture as they study the environment, food and nutrition, and health in general.

The key to Wisconsin's success with Tech Prep is the statewide support and framework accompanied by effective local implementation strategies and flexibility. Agricultural education has played a significant role in impacting state and local directions through curriculum integration and articulation, performance-based instruction and assessment, and quality work-based learning opportunities. Together, through these efforts, Tech Prep and Agricultural education will continue to make a difference to Wisconsin students.

Contact the following individuals for information on:

Career Majors: Mary Jane Best-Louther, Education Consultant, Wisconsin Department of Public Instruction, (608)-267-3161

Wisconsin Instructional Design System: Judy Neill, (608) 929-2485. ■

Reference

Flaherty, M. (1991, January 3). Wisconsin State Journal , p. 8.

Tech Prep: A Catalyst for Change in Agriculture

BY SHIRLEY CHENAULT
Dr. Chenault is the tech prep coordinator for the western counties sector of the north central Texas tech prep consortium at Weatherford College, Weatherford, TX.

With the job market demanding technical skills and seeking employees with training beyond the high school level, Tech Prep programs in agriculture encourage students to consider career options and to pursue additional course work. By offering college credit as an incentive, the concept draws students who might otherwise disregard higher education as an option.

The Tech Prep initiative in agriculture at Weatherford College in Weatherford, Texas, was designed to be the catalyst for change in the lives of agriculture students and to meet the needs of a rural, agriculturally-based economy. Currently, the community college offers Tech Prep participants a one-year certificate program or the two-year associate of applied science degree in agriculture business or farm and ranch management. The initiative encompasses agreements with 30 high schools in a six-county service area.

The typical Tech Prep student in agriculture may enter the program with little confidence. He or she often expresses doubts about his or her future. The student generally questions his or her scholastic abilities, particularly at the college level. Faced with the possibility of ridicule or failure, many rural students will not consider higher education.

"Sometimes a student who attends Weatherford College does so only because he knows he is expected to attend college to get more education for a better job. This concept has been instilled in students throughout the educational process through grade twelve," explained Mike Brown, agriculture division director. In the Weatherford College service area, Tech Prep begins to bridge the confidence gap in high school by changing students' perception of themselves, their abilities, and the college environment.

The Tech Prep initiative first provides the college credit incentive as the "hook" for students and parents. At Weatherford College students can receive up to 18 credit hours, basically one semester, tuition free. The program sometimes acts as the catalyst to more parental involvement in their child's career track. A reduction in the sometimes heavy financial burden higher education creates will often lead parents to further encourage their child to consider earning a college diploma.

While financial constraint plays a major role in educational choice, for rural students the fear of the college classroom may carry greater weight. An agricultural sciences teacher at Millsap High School in Millsap, Texas, Johnny Hook has watched Tech Prep spark the drive in some of his students to risk the step toward a degree. College-level instruction in the familiar high school setting lessens the anxiety about higher education for many rural students. Successful completion of a Tech Prep course gives participants the first solid evidence that their abilities can indeed match college requirements. "Many of my students may not have attended college without this kind of boost," Hook said.

Weatherford College student Cody Pilgram probably would not have pursued higher education if not for the encouragement Tech Prep, his high school agriculture teacher, and college counselors gave him. He graduated from Peaster High School in a class of less than 50 students, a typical size for schools in the service area.

The average Tech Prep student enters Weatherford College with six to twelve credit hours toward his degree. Cody had completed six hours. Still unsure why he enrolled, he believed high school students "were just supposed to" do so.

While counseling his student, Brown felt Cody still harbored doubts about his choice. "First, he did not know if he would succeed academically even though he had already earned some credits. Second, he did not know which agricultural careers would be available after completing his education," Brown said.

With the seed planted by college credit earned at Peaster High, sound counseling, and careful course selection, Cody developed the confidence to complete Weatherford College requirements. That confidence will carry him to Tarleton State University in Stephenville, Texas, where he plans to complete a degree in animal science.

"After a student enters the agriculture pro→

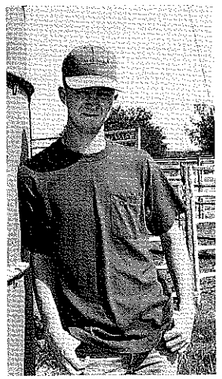
→gram, they quickly discover they can succeed in college. Most of these students decide to go beyond the two-year degree and work toward a bachelor's degree in agriculture. I have found that they are usually very successful," Brown added.

Confidence won in academic pursuits also carries over into employment. As an employee of Stroud Veterinary Embryo Services, Cody assists Dr. Brad Stroud with embryo transfer procedures, as well as performing other assigned tasks. The 20-year-old also works two or more hours each evening and most weekends on his family's 300-acre ranch.

In addition to changes reflected in individual students, Tech Prep positively affects participating high schools. According to area educators, the quality of students attracted to agriculture at the high school level has risen over the initiative's four-year history.

"The grade requirements for articulation have helped develop more serious students. They want to maintain the standards necessary to remain in the program," Hook added. In some schools, Tech Prep has also increased overall enrollment in agriculture classes.

Tech Prep impacts students lives through increased opportunity beyond the community college level as well. According to Dr. Gary Briers of the Texas A & M University System, universities are now relying on two-year colleges to provide applied skills training needed in four-year agriculture programs. Many universities, such as A & M, have dropped technical skills courses from their curriculum. But, Briers believes students need those skills to successfully join today's work force. Since Tech Prep participants may acquire technical skills in high school, they may have an edge later when completing their four-year program.



Tech prep provided Cody Pilgram the confidence and skills to complete an associate of applied science degree at Weatherford College. Now employed by a local veterinary embryo service, Cody plans to enroll in a university program this fall. (Photo courtesy of Weatherford College.)

The agriculture initiative has also opened the doors to innovative plans for transition from high school to community college to university. Many two-year and four-year institutions have developed articulation agreements to pass credit for similar programs between schools. Tech Prep makes articulation possible from high school through a bachelor's degree program.

Originally conceived as a six-year plan within the area, Weatherford College now has an eight-year articulation agreement in place with participating high schools and Tarleton State University (TSU). The eight-year plan provides pathways with exit points beyond the associate degree level. Following a chosen Tech Prep eight-year plan, a technical major may opt to earn a high school diploma, a one-year college certificate, an associate of applied science degree, an advanced skills certificate and, ultimately, a bachelor's degree. The participant may choose to end his formal training at any of those points.

In 1995, the United States Department of Agriculture statistics predicted an annual national shortage of over 5,000 college graduates in the food and agricultural science areas. Dr. David Drueckhammer, a professor in the department of Agricultural Services and Development at TSU, believes the agricultural industry will need an increasing number of employees with technical skills. He believes a majority of those will find the appropriate training beyond high school, but with less than a bachelor's degree.

However, at least in the North Central Texas region, that trend may be changing. Agribusiness leaders of larger firms in this area maintain a policy of hiring only four-year or higher degreed individuals for technical positions.

Due to cutbacks in federal funds, the U. S. Soil and Water Conservation Districts have been downsizing. As a result, a policy of hiring only degree recipients has been instituted. Districts also search for qualified individuals who possess a strong work ethic.

Since this year will see the first Tech Prep students graduate from two-year institutions, changes affected by the agricultural program on local and area businesses have yet to be measured.

Agricultural employers in this area want employees who display strong basic skills in math, science and communications. They prefer resourceful individuals who are team players. Employers also seek workers who are customer oriented and sensitive to specific needs without regard for time schedules and other restrictions. Administrators, instructors and staff at Weatherford College and in participating high schools believe the Tech Prep program in agriculture is the catalyst to provide the high quality employees, managers and agricultural leaders of the future. ■

References

Chenault, S. "Optimum university credits available for tech prep transfer students." **Tech Prep Update**, 4 (2) 1,5. (Newsletter for the Western Counties Sector of the North Central Texas Tech Prep Consortium. Available from Weatherford College, Weatherford, Texas 76086.)

Drueckhammer, D. "Excellent job opportunities predicted for agricultural students." **Tech Prep Update**, 3 (3) 1,4. (Newsletter for the Western Counties Sector of the North Central Texas Tech Prep Consortium. Available from Weatherford College, Weatherford, Texas 76068.)

What's a Passport . . . LISD Variety?

BY REECE BLINCOE, MONA CORBETT, AND DOAK STEWART

Mr. Blincoe, Ms. Corbett, and Mr. Stewart are agricultural science teachers at Leander High School, Leander, TX.

The Tech Prep Career Passport documents that a student has successfully completed at least a three-credit concentration within one of six tech prep career pathways (business, communications, fine arts, science, service, or technology). The passport also includes a resume prepared in the senior year, a letter of recommendation from a teacher, and a portfolio of student work accomplishments. Leander High School's Tech Prep Career Passport is designed to market student's skills, competencies, and attributes to potential employers. We feel that packaging these items gives our students the edge in applying for jobs.

This packet is developed during the student's four years in high school, and it provides a cumulative, performance-based assessment of the student's achievements. It offers a focus for the student's energies and is a source of student pride. It also provides a system that teachers can use to confirm that students have the job readiness, competencies, and skills needed to be successful.

The administrators and faculty members at Leander High School recognize that the world of work has changed radically. Students who graduate from high school today are faced with a job market vastly different from what we witnessed in the past. Teachers now realize they can no longer teach only from the textbook, but must provide students with real world applications. Leander High School gives all students the tools to plan career opportunities. Students need real-world work experiences to prepare them for what lies ahead. Teaching students to choose a career is essential.

The Tech Prep Career Passport is designed to be a very broad and flexible career path. Even after a student has completed high school or college, the passport can be adapted to fit new requirements. Leander High School students get a clear picture of what it takes to be successful in an ever-changing world.

Leander Independent School District

The Leander Independent School District (LISD) is 18 miles northwest of Austin, Texas, and covers 200 square miles. The district consists of seven elementary schools, two middle schools, and one high school (with one more planned to open in the fall of 1998). Major employers in the area are the State of Texas and many high tech industries.

The Leander High School Agricultural Science Department is comprised of three teachers, each with their area of specialization. The areas are animal science and aquaculture, horticultural science, and agricultural mechanics. The student enrollment in the agricultural science classes has been between 400 to 450 students each semester for the past two years. Also, each area offers its own Career Passport. The Animal Science and Horticultural Science Career Passports are labeled under the Science Career Pathway while the Agricultural Mechanics Career Passport is one of several passports under the Technology Career Pathway.

Career Development System

The career development system, which began more than 10 years ago as a program for students in the business department, has grown to provide comprehensive career-planning opportunities and experiences for all students. The career development system has five major components: Tech Prep Career Passport (discussed in this article), Career Education, "Bridge Building", School-Business Partnerships, and Student Follow-up.

Tech Prep Career Passport

The backbone of the career development system is the Tech Prep Career Passport program. All other career-related programs and activities supplement or complement the passport program. Students pursue a coherent sequence of courses (a passport) within one of six tech prep career pathways (totaling more than 35 passports) after completing a career investigation/planning course in ninth grade. Upon graduation, students receive a Tech Prep Career Passport, and a brighter future.

Benefits

Perhaps the Tech Prep Career Passport program can best be defined by its benefits. For students, the program provides focus and a coherent sequence of courses that will provide them with skills consistent with their career

(Continued on page 23)

What's a Passport...LISD variety?

(Continued from page 22)

goals. For teachers, the program provides a way to check the relevance of the classroom experience with the real world. For employers, the program provides a better-prepared work force.

Development Process

Three things drive the development and revision of the passports: the LISD graduate profile, employment trends, and student interests and aptitudes. In LISD, everything we do and every learning activity is focused on our district's purpose and vision. This is what caused the creation of the graduate profile. The LISD profile describes graduates as academically prepared, effective communicators, responsible citizens, productive learners, and prepared for life.

Employment trends play a key role in the process. The preparation students receive in high school must translate into better employment training opportunities upon graduation. LISD strives to stay current on the present and future employment trends in order to revise and update our Career Passport system.

Formal assessment of student aptitudes and interests is the final system driver. All students take a half-credit freshman orientation course that focuses on career investigation and planning. During this course, students take two formal career-related assessments: the CAPS and COPS assessments. From these assessments, Leander High School developed the six tech prep career pathways.

The development process for passports is the key to the far reaching impact of the Tech Prep Career Passport program. Every step of the development process involves a feedback loop with business. By reaching out to businesses, teachers better understand what local industries need. When they take that information back to the classroom, students see the relevancy of what they are learning, and everyone benefits.

As the Tech Prep Career Passport program grew, committees were established with volunteer chairpersons. These committees develop new passports and improve/update existing passports as needed. As needs arise, based on the graduate profile, student interests, aptitudes, and employment trends, committees work on solutions.

Articulation of Courses

As a whole, Leander High School articulates many courses with area colleges and universities, the major one being Austin Community College. Articulation is an agreement between a high school and a college or university which allows high school students to receive college course credit for certain courses taken in high school. This agreement benefits all that are involved (the high school, the college or university, and the student). The high school benefits through increased student interest and participation in courses. The colleges benefit by having these students attend their campuses to further their education after high school. The students benefit from the agreement by getting a head start on their college career while in high school and by saving the expense of actually attending a college to get college course credits.

The Career Passport system at Leander High School works ideally with articulation. The Leander Agricultural Science Department has an articulation agreement with Southwest Texas State University, and through this articulation agreement, it is possible for a student to graduate high school and already have 14 hours of course work at Southwest Texas State University before the articulation credits are put on their transcript.

The Career Passport system has changed what we believe at Leander High School. Since implementing the program, the number of students receiving passports has greatly increased each year with some students receiving as many as three to four passports upon graduation. The Leander Independent School District believes in the Career Passport program whole-heartedly, and this is evident by our school board's decision to make the Career Passport a requirement for all students that graduate from Leander High School starting in 1997.

(For more information about Career Passports, you may contact Mark Kincaid, Leander High School Transition Coordinator, at 3301 S. Bagdad, Leander, TX 78641 or by phone at (512) 435-8000.) ■

What Do You Know About the FFA Student Magazine?

By Gary E. Moore

Dr. Moore is a professor of agricultural and extension education at North Carolina State University, Raleigh and is the historian for the American Association for Agricultural Education.

For years FFA members have received a magazine from the national FFA. This month's questions focus on that magazine.

1. Discussions by delegates at a national FFA convention about starting a magazine for FFA members first occurred in:
   a. 1929.
   b. 1935.
   c. 1945.
   d. 1950.
2. The FFA student magazine was start ed in:
   a. 1939.
   b. 1946.
   c. 1950.
   d. 1952.
3. The original name of the FFA student magazine was:
   a. The Rising Sun.
   b. The National Future Farmer.
   c. FFA New Horizons.
   d. The Young Farmer.
4. The cover of the first FFA student magazine contained all of the follow ing except:
   a. A herd of Angus cattle.
   b. A FFA member.
   c. A horse.
   d. A former Miss America.
5. Prior to the introduction of the official FFA student magazine, many FFA members received a magazine orient ed toward the FFA that operated with the endorsement of the FFA. The name of this magazine was:
   a. The American Farm Youth.
   b. Boys Life.
   c. The Young Farmer.
   d. Clover and Corn.
6. The FFA magazine was originally published four times a year. Since 1956, it has been published ___ times per year.
   a. 6
   b. 9
   c. 10
   d. 12
7. Charlie, the cartoon character on the back page of the magazine, was named:
   a. After the first national FFA advisor, C. H. Lane.
   b. After the nickname given to American soldiers who served in World War II.
   c. After Charlie McCarthy, a famous ventriloquist who had a dummy who resembled the cartoon Charlie.
   d. By FFA members in a national contest sponsored by the magazine.
8. Over the years, the FFA student maga zine has conducted numerous con tests. Which of the following was not a contest sponsored by the magazine:
   a. Fishing.
   b. Corn growing.
   c. Livestock judging.
   d. Writing a caption for a cartoon.
9. The current name of the FFA student magazine is:
   a. The Rising Sun.
   b. The National Future Farmer.
   c. FFA New Horizons.
   d. The Young Farmer.
10. The FFA student magazine was pro duced by the FFA staff until it was out-sourced to ABC/Capital Cities. The first issue published by this group was in:
    a. 1985.
    b. 1989.
    c. 1993.
    d. 1996.

The following are the answers to the questions published in the June, 1996 issue of The Agricultural Education Magazine.

1. b. National Association of Vocational Agriculture Teachers.
2. c. 1948.
3. a. James Wall.
4. d. Lincoln, Nebraska.
5. b. California.
6. a. D-Con (many agriculture teachers of that era called their pocket diary "the rat book".).
7. d. Mink bow ties.
8. c. 1979.
9. a. Jim Guilinger.
10. c. MeeCee Baker. ■