TECH PREP
A Catalyst for Change
Tech Prep: A Catalyst for Change

Tech Prep is starting to make sense to the educational administrators. 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 too much. The world has changed.

In the Fortune magazine cover story "The New Worker Elite," Louis S. Richman wrote, "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-competeants—already the largest broad occupational category in the U.S.—will represent a fifth of total employment within a decade." (Richman, 1994, p. 50.) 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 our educational system. 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 agricultural program in a high school to improving all of high school education.

First, we must eliminate the generic educational track. Once adequate for general preparation, this track has not kept up — impressing 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 workplace. Much of what we are doing in our current educational structure is setting 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 Parcell, 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 —
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Since 1991, states have implemented Tech Prep, a program that focuses their efforts on the middle 50 percent of students while oth-
er 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 serve all students through sys-
temic reform and system building and helps them transition from secondary to postsec-
ondary education and the workplace. The School-to-Work Opportunities Act (STOWA)
legislation was a natural extension of this reform and is built on Wisconsin’s strong foun-
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Agricultural Education Integral to Tech Prep

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fields. Agritourism in Wisconsin directly provides 9.6 percent of all the state's jobs or 213,760, and 2.2 million jobs according to a 1990 study (Wisconsin State Journal).

The extensive research and commercial production in biological sciences and the application of these technologies in health, agriculture, dairy science, crop production, and food science, and research in human and biomedical sciences is creating a prime area for job and increasing 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 can aid students to apply their knowledge in a variety of settings.

Biototechnology is an example of a rapidly-growing field that is capturing students' interest at a younger age. Wisconsin is a Midwest center for biotechnology-related industries that focus primarily on research and development applications of biotechnology, particularly seed genetics and bio-enzyme products. This focus on agricultural biotechnology applications crosses all levels of education and provides an opportunity for collaborative teaching. For example, the strength of secondary, technical college, and undergraduate programs in biological sciences is creating a demand for biotechnology and molecular biology. The creation of career opportunities in new areas, as well as broadening career options in traditional areas, 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 insects, or the use of recombinant DNA techniques to modify a cotton plant that produces unusually long or green cotton bolls, are examples of practical product-based applications. These examples and new job opportunities: Thiese and other applications are derived from technologies developed to explore basic understanding of biology. The transfer of new products and processes from 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.

—Cited by Lee A. McMillan, McMillan is the director 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 is becoming 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

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 four-year universities, the Wisconsin Technical College System (WTC) spearheaded a project to develop 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 WTC. The results of this collaboration are 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 1995. Five high schools piloted the curriculum 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 systemically used by Wisconsin high schools. These courses will also be used as the basis for a state cooperative skills 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. First, it is critical, 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. Develop with state and national industry skill 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 curriculum 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. Jankowski and Kevin Champenois. Mr. Jankowski is the director of Northeast Wisconsin Technical College, Green Bay, WI. Mr. Champenois 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 has organized the teacher-to-teacher interaction necessary for true curricula 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 educators 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 curriculum 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 curriculum language and framework presents a daunting task, particularly when format and outcomes differ between secondary and postsecondary education. The WIDS is one approach used across the state that is used to assess students' expectations through performance-based instruction and assessment and a common curriculum language that educators on both levels understand. This further was used to develop the Wisconsin Agriculture education curriculum articulation projects to transform the knowledge and skills identified by industry into competencies with learning activities and accompanying software tools required for 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 curriculum language and framework that facilitates competency comparison through articulation and is used by all 16 technical colleges and more than 156 high schools statewide.

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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 STWQA emphasizes its importance in preparing students for the future workplace. Through state support and STWQA resources, Wisconsin has developed state accredited 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-valuated biannually.

The Cooperative Education Skill Certificate in Agricbusiness-Plant Science differs from traditional programs in that it includes 80 state certified competencies which have been validated by business and industry with secondary and post secondary employer input. 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 1996-97 there were 730 youth apprenticeship students and approximately 1200 skill certified cooperative education students enrolled in Wisconsin high schools. Through STWQA 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 identifying a need for students trained in Biotechnology and making a commitment to providing 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 assessment criteria. Students must master 92% of the competencies in order to receive a state certificate in Biotechnology. Students are also paid employees of participating businesses for a minimum of 10-15 hours/week and receive instruction on the job, as well as in school. Apprenticeship agreements help students transition to one of the state's 16 technical colleges offering comparable courses in biotechnology. A statewide articulation agreement specifies that students may receive 11 credits upon enrollment in a Wisconsin technical college Biotechnology Laboratory Technicians program.

The support for Biotechnology Youth Apprenticeship students is exceptional. Employers not only provide wages, but time and support through on-site mentors and instructors. They also see the benefit in their research 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 completed on schedule. 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 Island Miunions.

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 example 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 dealerhips 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 work-site 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 they fill a vital industry need for quality-trained instructors.

Career pathways provide students opportunities to develop new skills and further their education. They do this 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 how injection 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

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.

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 I & II, Algebra 2; or Algebra I, 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, Text 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).

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

<table>
<thead>
<tr>
<th>Career Goal: Graphic Design</th>
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<tbody>
<tr>
<td><strong>Year 9</strong></td>
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<tr>
<td>Career and Personal Development</td>
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<tr>
<td>English I</td>
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<tr>
<td>Reading &amp; Speech</td>
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<td>Principles of Technology</td>
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<td>Applied Math I</td>
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<td><strong>Year 10</strong></td>
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<td>Technical Writing</td>
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<td>Applied Math II</td>
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<td>Art I</td>
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<td>Health/Physical Education</td>
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<td><strong>Year 11</strong></td>
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<td>Printing &amp; Graphics</td>
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<td>Creative Writing</td>
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<td>American Government</td>
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<tr>
<td></td>
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<tr>
<td><strong>Year 12</strong></td>
</tr>
<tr>
<td>US History</td>
</tr>
<tr>
<td>Media Production</td>
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</tbody>
</table>

Advanced High School: Graphic Design course of study
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

(These 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.

Business and Management Career Pathway

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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.

Health Services Career Pathway

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Career Goal — Accounting

Year 9:
- Career Application
- Computer Applications
- Math Science
- English I
- Reading & Speech
- Communications Technology

Year 11:
- Computer Applications
- Business Math Applications
- Biology or App. Biology/Chemistry
- English II
- Health & Personal Education
- Geometry

Career Goal — Nurse

Year 9:
- Applied Math I
- Health Science
- Reading & Speech
- Social Studies
- Principles of Technology
- English II
- U.S. History

Year 11:
- Health Occupations I
- Health Occupations II
- Sociology

Career Goal — Nurse

Year 10:
- Health Occupations III
- Principles of Tech.
- English III
- Sociology

Career Goal — Nurse

Year 12:
- Anatomy
- American Government

Career Goal — Nurse

Planned Beyond High School: Accounting degree (course of study)

Career Goal — Nurse

Planned Beyond High School: Health Occupations (course of study)
**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.

**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
- **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 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 an example:

### Career Goal — Child Life Specialists

**Year 9:**
- Career & Personal Development
- Applied Math 1 & 2 or Algebra 1
- Applied Biology & Chemistry
- English I
- Social Studies
- Elective

**Year 10:**
- Nutrition & Foods or Teen Living
- Applied Math 2 or Algebra 2
- Biology
- English II
- Sociology or Psychology
- Reading & Speech

**Year 11:**
- Childhood & Child Development
- Algebra II
- Principles of Technology
- English III
- US History
- Family Health & Wellness
- Elective

**Year 12:**
- Principles of Technology
- Advanced Math
- Principles of Technology
- English II
- Elective
- Elective

**Year 13:**
- Principles of Tech
- Applied Math
- Principles of Technology
- English III
- US History
- Family Health & Wellness
- Elective

**Place Beyond High School — Child Development course of study**

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**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, Applied Agricultural Science Courses, Chemistry, Biology, Physics
- **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
- **Agribusiness** - Small Gas Engines, Welding Technology
- **Business and Marketing** - Computer, Accounting, Business Law, Marketing
- **Work-based Learning** - Cooperative Education in Industrial or Engineering Fields, Apprenticeships (The above courses are examples of 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 an example:

### Career Goal — Electronics Technician

**Year 9:**
- Introduction to Technology
- Electronics Textbook
- English I
- Principles of Technology
- English II
- US History
- Computers, Aimed Design

**Year 10:**
- Introduction to Technology
- Electronics Textbook
- English I
- Principles of Technology
- English II

**Year 11:**
- Elective
- Principles of Technology
- Advanced Math
- Principles of Technology
- English III

**Year 12:**
- Principles of Technology
- Advanced Math
- Principles of Technology
- English III
- US History
- Computers, Aimed Design

**Place Beyond High School — Electronics course of study**
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.

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

Pathways parallel a mechanism to optimize a low level general track that does not prescribe students for further education or the world of work.

Career Goal — Wildlife Specialists

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td>Basic Education</td>
<td>Applied Math II</td>
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<tr>
<td>Writing</td>
<td>Biology or Applied Biology/Chemistry</td>
</tr>
<tr>
<td>Math</td>
<td>English II</td>
</tr>
<tr>
<td>Health &amp; Speech</td>
<td>Humanities Elective</td>
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<tr>
<td>Year 2</td>
<td>Year 12</td>
</tr>
<tr>
<td>Science/Environmental Science</td>
<td>Zoology/Fish and Wildlife Science</td>
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<tr>
<td>Agriculture</td>
<td>Agriculture Education</td>
</tr>
<tr>
<td>English</td>
<td>Principles of Technology</td>
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<tr>
<td>Science/Environmental Science</td>
<td>Applied English or English IV</td>
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<tr>
<td>Humanities Elective</td>
<td>Humanities Elective</td>
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<tr>
<td>English Elective</td>
<td>American Government</td>
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<tr>
<td>Progress</td>
<td>Remediate</td>
</tr>
<tr>
<td>High School</td>
<td>Natural Resources Continuation</td>
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</tbody>
</table>

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

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 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 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 curricular...
Tech Prep: A Catalyst for Change

(Continued from page 8)

Robert Merrill, a high school senior enrolled in the Tech Prep Environmental Science program at Cincinnati State and CLEP College, is recording data on plants being raised in unique controlled environments. (Photo courtesy of Terry Hughes.)

Susan Credle, a junior at Greenville Central School, is shown using a model to identify specific components included in the environmental science curriculum. (Photo courtesy of Terry Hughes.)

Jim Sill, a senior at Greenville Central High School, is shown here working on the agriculture recirculation system which is located in the school's greenhouse. Olmos de Forte, Head of Science, explains the system in which water from the aquatic system is used to grow flowers and vegetables. (Photo courtesy of Terry Hughes.)

The Agricultural Education Magazine
Tech Prep: A Catalyst for Change in Agriculture

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 coursework. 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 academic abilities, particularly at the college level. Faced with the possibility of ridicule or failure, many rural students will not consider higher education.

"Sometime 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," Brown said. "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, students begin 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. At Glen Rose, Texas, high school 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 a college without this kind of boost," Hook said.

Weatherford College student Cody Pilgrim 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 Runen High School in a class of less than 50 students 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 only 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 received Tech Prep credits. Second, he didn't know if he would have a bachelor's degree program 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 from Texas Tech University in Stephevesville, Texas, where he plans to complete a degree in animal science. "After a student enters the agriculture program, 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 Strother Veterinary Enzyme Services, Cody assists Dr. Brad Strother 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 diverse 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 that live in areas in the county and in the region. It is expected that more high school students will graduate from high school and pursue higher education.

The agriculture initiative has also opened the door 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 to community college.

Originally conceived as a six-year plan within the county, Weatherford College now has an eight-year articulation agreement in place with participants from Tarleton State University (TSU). The eight-year plan provides pathways with exit points beyond the associate degree level. Following a chosen Tech Prep option, a technical major may opt to earn an associate 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 enter the 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 Drukebimmer, 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. Agriculture leaders of larger firms in this area maintain a policy of hiring only four-year or higher degree 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 have acquired basic skills in math, science and communications. They prefer resourceful individuals who are team players. Employees 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

What's a Passport...LISD Variety?

The Tech Prep Career Passport document, which has been developed so that a student has successfully completed at least 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. They now realize that 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.

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 can 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 late 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 (totalling 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 be best 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 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 mission. 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 is trying to stay current on the present and future employment trends in order to revise and update the 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 COPES 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/upgrade 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 is a partner in the Career Passport program wholeheartedly, and this is evidenced 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.
What Do You Know About the FFA Student Magazine?

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 started 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 following 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 oriented 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 magazine has conducted numerous contests. 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 produced by the FFA staff until it was outsourced to ABC/Capital Cities. The first issue published by this group was in:
    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.