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ABSTRACT

This document consists of the 36 issues of a newsletter issued during 1994. Each issue is devoted to a specific topic pertinent to Tech Prep. Tech Prep is a federally funded effort, including mathematics, sciences, and language arts, that aims to prepare students for a lifetime of learning and career advancement. The Northwest Tech Prep Consortium exists to provide resources for participating schools to implement a Tech Prep program that will be implemented in grades 11 and 12 and the first 2 years of college with a common core curriculum that will lead to an associate degree or certificate in a specific career field. The newsletters are grouped into eight series. The six newsletters of the first series concentrate on the concepts and definitions of Tech Prep and how to start a Tech Prep program. The second series of five newsletters focuses on applied courses, and the four newsletters of the third series concentrate on preparation for business, health, and technical programs and careers, in general. The fourth series devotes eight newsletters to articulation of Tech Prep programs and the coordination essential between high school and college components. Series 5 contains 2 newsletters dealing with working with business. The sixth series provides three newsletters with examples of projects in Missouri and the country as a whole. The seventh set (six newsletters) deals with administrative concerns, and the eighth series contains two newsletters dealing with guidance and Tech Prep in the schools and a discussion of classroom practice. (SLD)

TECH PREP NEWSLETTER

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CONCEPTS

WELCOME to the Northwest Missouri Tech Prep Consortium. With this newsletter begins a series of informational bulletins. Each will contain information about a specific topic pertinent to Tech Prep.

TECH PREP is . . .

Tech Prep is a federally funded effort. It is to prepare students for a lifetime of learning and career advancement. The graduating students of today need to be life-long learners, to know how to seek and obtain good wages, to have the opportunity for upward mobility in our society. Typical curricula rarely provides these things . . . even for the college prep students.

Technology is not a sub-section of math or science. It is unique, incorporating math, science, and other subjects so students receive relevant, meaningful, and useful information. Math, science, and language are put "in-context" with real applications.

TECH PREP is DIFFERENT

Tech Prep is different because it recognizes the need for all students to become lifelong learners and possess the skills necessary to succeed in the work force. Some schools have tried to address this need by emphasizing higher-order thinking skills.

However, most of the students exposed to this are the "gifted" students and the "general" school population is left out. Even the "gifted" program efforts are not enough. Everyone deserves to know "where will this be used?"

TECH PREP is LANGUAGE ARTS

All professional and technology sensitive positions require continual upgrading of knowledge and technical skills. Without this continual effort, the person filling that position is at extremely high risk of loosing it.

This struggle to update skills and knowledge usually occurs by reading professional or technical material (e.g., journals, articles, manuals). Very few curricula teach technical reading and writing, or any form of listening (the most commonly used communications skill in all aspects of life!). Most research has concluded that reading and writing skills develop best when taught in-context. Tech Prep emphasizes curricula that focus on the reading, writing, speaking, and listening skills required of a lifelong learner.

TECH PREP is SCIENCE

The major high school lab-science classes are biology, chemistry, and physics. Usually they are taught in that order because decades ago a study concluded that the order didn't matter so take them alphabetically. Today it does matter. The #1 science course with direct application to jobs in the 1990's and beyond is physics. Tech Prep includes curricula focusing on physics and related math for the 9th and 10th grades and higher.

TECH PREP is MATH

College prep math courses in the high school curriculum are so abstract and esoteric that most students cannot associate the

concepts to any relevant activity. However, math is relevant. Tech Prep has courses that engage and prepare students for a lifetime of new challenges, new knowledge, and continual learning. Math with the experience of an application is math at its best!

OUR CONSORTIUM is . . .

The purpose of the NW Tech Prep Consortium is to provide resources for participating schools to implement a Tech Prep Program. This consortium exists to assist schools in workshops, in-service programs and in defraying the costs of training.

FOR STUDENTS OUR CONSORTIUM will . . .

1. Be carried out through written agreements and include the 11th and 12th grades in high school and the 13th and 14th grades in college.
2. Include a common core of mathematics, science, communications, and others that will lead to an associate degree (or certificate) in a specific career field.
3. Provide equal access for members of special populations and provide preparatory services to assist all participants in Tech Prep programs.

FOR FACULTY OUR CONSORTIUM will . . .

1. Provide in-service for teachers, counselors, administrators, and others.
2. Support articulation and coordination.

WHAT DO WE MEAN by . . .

Articulation agreement: a commitment by secondary and postsecondary schools to provide a non-duplicative sequence of progressive achievement leading to Tech Prep program competencies. Courses between schools are a progression one to the other like English I and English II.

Tech Prep programs: coordinated secondary and postsecondary programs leading to an associate degree or 2-year/PS technical certificate in engineering, technology, applied science, mechanical, industrial, or practical art/trade, or agriculture, health, or business. They will build student competence in mathematics, science and communications and lead to placement in employment.

OUR CONSORTIUM is NOT . . .

The NW Tech Prep Consortium will not impose articulation agreements on any school; nor will this consortium dictate courses or curriculum to be implemented. These decisions will be made by each school. Consortium members (AVTS's and MCC) can use consortium resources to help decide articulation and curriculum questions.

This may be one of the very few times where federal money is available without a strict mandate of what must or must not be done.

THE TECH PREP PRESENTERS GROUP

The consortium has trained a group of people to assist in workshops and in-service programs. The presenters have received special training to help local schools or other groups. They may be called upon for presentations, to lead discussions, as resources for work sessions, and to contribute to local efforts in getting Tech Prep started.

THE PRESENTERS ARE

Karen Dexter, Penn Valley CC (KC), 759-4350
Barbara Eubank, Longview CC (Lee's Summit), 762-2334
Jim Everett, Metropolitan CC (KC), 759-1167
Bill Foster, Metropolitan CC (KC), 759-1208
Kathleen Gibbons-Shepherd, Ed/Bus. Alliance, (Park Hill), 741-1521
Judith Moore, Metro HS (KC), 871-8150
Milton Moore, Hillyard AVTS (St. Joseph), 232-5459
Cheryl Parks Hill, New Perspectives (KC), 858-3723
Mike West Maple Woods CC (KC, north), 437-3000
Lori Worthington, Maryville HS (Maryville), 562-3511

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2 + 2 (2 + 2 + 2 ?)

What is the question? 2+2 or 2+2+2? Does it make a difference? What do you mean? Federal law requires 2+2 which includes the high school junior and senior years plus the college freshman and sophomore years. Can other structures be tried?

2+2 PURPOSE

1. Eliminate duplication between classes at the high school and college level.
2. Make the transition between high school and college smooth and seamless rather than an abrupt change or with duplication.
3. Create a mind set where high school graduation is one of many steps along the way to further education, becoming ready for work, and preparation for lifelong learning.

WHO PARTICIPATES

Federal law (Perkins-II) requires that Tech Prep provide juniors and seniors two years of further educational opportunities. Typically this means a local high school and a community college will sign a formal agreement to "articulate" classroom work from one to the other.

A high school may have these formal agreements with more than one college, just as a college will have agreements with many high schools. One college may have classes and programs in certain areas, but not in others. For a high school needing Tech Prep in many programs, more than one post-secondary institution may become involved.

CRITERIA FOR DEVELOPMENT

When deciding what goes into a 2+2 program, the answer comes primarily from business. The selection will be driven by the occupations in our region that will be in demand 3 to 5 years down the road.

These selections will not necessarily be obvious. Individual businesses employing many people today may not exist in a few years, and entrepreneurs of today in "mom & pop" shops may have huge growth in the future. Nevertheless, surveys from labor and business indicate significant growth in the areas of business, health, and technology related jobs. Tech Prep can prepare students for each of these areas.

CURRICULUM

What must the student be able to do when finished with the instruction? Curriculum will include the technical skills, communications skills (technical reading and writing, speaking and listening), math, and science.

For 2+2, interpersonal skills and job-readiness is as important as the areas mentioned above. Employers are demanding workers with the ability to work in teams to improve quality and productivity.

COLLEGE CREDIT

Some of the classes taken at the secondary level may receive college credit. Recent Missouri legislation offers more

opportunities for dual credit than ever before. Dual credit for Tech Prep classes can encourage student participation. While college credit may or may not be available to secondary students, the criteria for completion of Tech Prep is set by the businesses (customers) who will employ (purchase) our students (products). The ultimate goal of Tech Prep is effective, productive members of society capable of continually improving themselves.

LENGTH OF PROGRAM

The law stipulates a term of two years past high school graduation. However, provisions exist for Tech Prep to include apprenticeship. Also, knowledge in "all aspects of the industry" are required as part of the basic Perkins legislation. Opportunities for work experiences and connecting activities can be a significant and vital part of the curricula.

PROGRAM COMPLETION

Students will complete Tech Prep 2+2 with an associate degree or in some circumstances a certificate. Many colleges are now awarding the Tech Prep Associate Degree (TPAD). The degree will have a specialization in a specific area (e.g., business accounting or radiation technician). Students choosing to complete a certificate first will be able to return to complete a degree in many cases.

With significant input from business at the start (of Tech Prep) and continuing involvement, the Tech Prep Associate Degree will become a recognizable standard within the business community. Unlike the high school diploma, TPAD 2+2 can offer both the prospective employer and the prospective employee some assurance. An employer will know more about a TPAD applicant. The applicant will know more about what is expected on the job. Both win.

WHAT ABOUT **2**+2+2 (4 + 2)

After reviewing the necessary knowledge, skills, and behaviors required in most employment, many educators wonder how all this can be taught in just four years (2+2). One alternative is to start earlier.

Most schools are becoming aware that students must be technologically literate. Computer and keyboarding skills are being taught in earlier and earlier years. If too much curriculum exists for starting Tech Prep in the 11th grade, then some basics must be included in the earlier years. This is where the idea of a two year preparation for Tech Prep developed (i.e. **2**+2+2).

However, just pushing some skills to lower grades isn't the final answer. A complete and objective analysis of what is needed and not needed in a school curriculum must occur.

OR IS IT 2+2+**2** (2 + 4)

Once a complete Tech Prep curriculum is developed from the 11th through the 14th grades, the next logical question is, "Can this student continue?" The answer can be, "Yes!"

The Tech Prep Associate Degree is academically the equivalent of other associate degrees. Therefore, those receiving this degree may transfer to baccalaureate degree institutions as well. Some may call this "2+4".

USE OF TECH PREP FUNDS

Missouri's interpretation of the Tech Prep legislation limits the use of Tech Prep funds. The money may be used for in-service activities and program coordination affecting the last two years of high school and the first two years of college. Funds may also be used for curriculum development. **Remember** keep good records!

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DEFINITIONS & RESOURCES

Buzz words and abbreviations have always been a part of education. Tech Prep has formed or is associated with many terms, ideas, and resources.

– – –

AAS - Associate of Applied Science, the traditional technical degree of community colleges.

AB/C (CORD) - Applications in Biology and Chemistry, an in-context course teaching critical concepts identified by business and industry. This course uses lab and other experiences to show how the interaction of biological and chemical activities affect production, services, and our lives.

AIT - Agency for Instructional Technology, Box A, Bloomington, IN 46402 1-800-457-4509

Applied Communications (AIT) - an in-context course building concrete skills in the critical areas often excluded in a traditional language-arts curricula. These skills include reading and writing for specific information, for critical analysis, and for evaluation; listening and speaking for information, and effective interaction.

Applied Math (CORD), an in-context course developed through cooperation with the National Council of Teachers of Mathematics (NCTM). The concepts taught are equal to those taught in traditional Algebra classes. However, authentic examples and genuine uses of the concepts are employed in the classroom activities.

Articulation Agreement - a document linking two or more educational systems within a region to help students make a smooth transition from one level to another without experiencing delays, duplication of courses, or loss of credit

CORD - Center for Occupational Research and Development, P O Box 21206, Waco, TX 76702-1206 (1-800-231-3015).

Hull, Dan - co-author *Tech Prep/Associate Degree: A Win/Win Experience* (available through CORD).

In-Context - The type of instruction for functional use, emphasized in Tech Prep, and based on educational research. A method of instruction where information to be learned is provided as solutions to bona fide, concrete situations and problems.

Lifelong Learning - the responsibility of every citizen in today's global economy. Basic skills such as technical reading and writing, math, physics, problem-solving, team participation, and quality assurance are pre-requisites. Many of these skills are not a part of typical school curricula.

NCRVE - National Center for Research in Vocational Education, Materials Distribution Service, Western Illinois University, 46 Horrabin Hall, Macomb, IL 61455; 1-800-637-7652

OBE - Outcomes Based Education - a method of educational assessment that incorporates authentic evaluation of a student's abilities and skills. Its basic tenets include:
1) ALL STUDENTS CAN LEARN,
2) SUCCESS BREEDS SUCCESS,
3) SCHOOLS CONTROL THE CLIMATE OF THAT SUCCESS.

Parnell, Dale - the author of *The Neglected Majority*, and co-author of *Tech Prep/Associate Degree: A Win/Win Experience* (both available through CORD).

Pedrotti, Leno - Editor of P.T. (Principles of Technology), Senior Vice-President, CORD.

P.T. - Principles of Technology, an in-context, applied physics course for high school level students. The original course developed for the purpose of demonstrating the connections between systems.

SCANS - A report by the Secretary's Commission on Achieving Necessary Skills. Commissioned by the Secretary of Labor, this group delivered several reports entitled, *What Work Requires of Schools*, *Learning a Living, Skills & Tasks,* and *Teaching the SCANS Competencies*. These reports are available through the U.S. Govt. Printing Office at 202-783-3238

SCANS
-EDUCATIONAL FOUNDATION:
Basic Skills--reading, writing, arithmetic and mathematics, speaking, and listening;
Thinking Skills--thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning;
Personal Qualities--individual responsibility, self-esteem, sociability, self-management, and integrity.

SCANS
-EDUCATIONAL COMPETENCIES:
Resources--allocating time, money materials, space, and staff;
Interpersonal Skills--working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
Information--acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information

Tech Prep programs are those placed jointly in secondary and postsecondary and:
a) run parallel with, not replacing college-prep programs,
b) combine a common core of learning and technical education,
c) provide basic proficiencies in math, science, communications, and technology,
d) present content "in-context" with use,
e) include grades 11 through 14,
f) build from basic career clusters and technical systems.

TPAD - Tech Prep Associate Degree, usually the final result of a Tech Prep articulated curriculum. A detailed guide is available through a series of workbooks entitled "The Tech Prep Resource Series." Recommended titles include: *Getting Started in Tech Prep*, and *Building a Tech Prep Curriculum*. All Resource Series publications are available through CORD.

Workplace Readiness (AIT) - a curriculum designed to be used in current or new classes rather than a stand-along course. The curriculum focuses activity units using video tape, video laserdisc, and/or computer software in the areas of Problem Solving, Teamwork, and Self-Management.

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QUESTIONS and ANSWERS

Tech Prep involves a multitude of activities that affect curriculum, professional development, student outcomes, community interests, and business needs. The following represents some of the more commonly raised questions, concerns, and requests.

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Why are we talking about Tech Prep?

The education committee of the U.S. House of Representatives heard testimony from businesses asking for schools to begin changing their curriculum so new employees would possess more of the skills needed in the work environment. Several models were discussed.

At the top of the list from these businesses were some fundamental requests: workers with technical competence combined with the ability to perform in the "basics." This list of needs developed under the banner of preparation for technology or Tech Prep.

Does Missouri support Tech Prep?

The Department of Elementary and Secondary Education (DESE) has voiced support through several channels. DESE's divisions of instruction and vocational & adult education, as well as the commissioner's office are supporting Tech Prep. As Missouri moves forward with statewide school improvement efforts, the Tech Prep methodology will be a resource for schools to implement important school improvement.

Tech Prep is an improvement in classroom methods as much as it is a change in content. Tech Prep can be an important source of professional development resources.

Who teaches Tech Prep?

Remember, Tech Prep is not a class any more than College Prep is a class. Both are a sequence of courses designed to place students in postsecondary education following graduation from high school. All students should one day become productive members of society.

Successful teachers of Tech Prep classes include innovative academic teachers from math, science, and English backgrounds as well as innovative vocational instructors. However, the methods of classroom instruction will be effected as much (or more) as the content of the course. Using the best research available on "brain based" learning, Tech Prep places an emphasis on valid content (context based curricula) delivery.

What is "context based" curricula?

Context based curricula means the information or content that teachers expect students to master must be taught with the application or relevance sharply in focus. Telling students that it will be used *sometime* is not meaningful. Using or discussing the context in which information will be used motivates students. When students need to accomplish a "real" task or solve a "real" problem, then "real" information and skills are learned and meaningfully applied to the task.

Teachers need to ask themselves, "Do I know where this is really used outside the classroom walls? If the answer is anything but a clear YES, the teacher must 1) find out where and how it is used, then convey that information to the students, or 2) drop the information or skill from the curriculum.

Does Tech Prep affect a person going to college?

YES, it helps! Tech Prep will help ensure that more students are capable of entering college without having to take developmental classes (classes that do not count toward a degree). This is accomplished by articulating grades 11-12-13-14 through committees composed of secondary and postsecondary faculty members. Tech Prep in high school is preparation for postsecondary education: college, certification, apprenticeship, etc. The Tech Prep legislation requires a jointly developed curriculum.

Are Tech Prep courses watered-down?

NO! Tech Prep courses are rigorous, academic, and functional. Further, some Tech Prep high school courses may provide dual-enrollment opportunities for the high school student. The curriculum is cooperatively developed by high school and college faculty. Vigorous course standards are maintained.

Tech Prep schools use curricula that place "in-context" the usefulness of math, science, and communications skills. They are reporting good success. Students are able to demonstrate significant capabilities.

Can a student change from Tech Prep to College Prep?

YES! And, a student can change from College Prep to Tech Prep. The classes used in Tech Prep are demanding. For example, one of the classes, Principles of Technology, is accepted as a lab-science course for admission to such schools as Northwestern University, MIT, Georgia Tech, Baylor University, all Kansas Universities and Colleges, and many Missouri universities and colleges including the University of Missouri-Rolla.

This acceptance of courses means students have a high degree of flexibility during their high school years. Of course no curriculum can be all things to all people.

What are the results of Tech Prep?

One example is in Richmond, NC where Tech Prep has been a part of the curriculum for over 5 years. They report increases in math SAT scores, increased enrollment in higher level math classes, and lower drop-out rates. Richmond and other schools also report more students taking postsecondary education classes as a natural extension of their high school graduation.

Some good data have been collected in states associated with the Southern Regional Education Board (SREB). Schools within this organization report significant and positive affects on secondary students: increased retention (decreased drop-out rates), higher assessment scores, and greater college success among others.

Remember:

With Tech Prep, high school is no longer a termination point for students. Secondary students see and respond to the need for further education after their senior year. High school graduation is important, but it is just one step along the way to a more complete education, a good career, and a lifetime of learning.

* * * * *

Further information can be received from the information listed in the "RESOURCES" newsletter, 1C. In addition, Richmond, NC and SREB can provide further information through the addresses below.

NC Tech Prep Leadership Development Center
Box 1189
Hamlet, NC 28345
919/582-7187

Southern Regional Education Board
592 Tenth Street, NW
Atlanta, GA 30318
404/876-9211

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TECH PREP / COLLEGE PREP

Educational reform is an on-going process. No matter what educators decide to do--or how to do it--some person or group will generate suggestions for how it could be done better. All of the efforts have as their goal to create a better educated population.

THE COMPETITION

Whereas in the past we have considered the education of Americans in an isolated sense, we must now consider other industrialized nations. We are increasingly finding ourselves in a globally competitive environment where the export/import of jobs and skilled workers is becoming as commonplace as the export/import of products. This point was addressed recently in *Fortune* magazine:

"A fundamental shift is under way in how and where the world's work gets done--with potentially ominous consequences for wealthy, industrialized nations. The key to this change: the emergence of a truly global labor force, talented and capable of accomplishing just about anything, anywhere. . . . 'The average American doesn't realize that there is a truly competitive work force out there that is vying for their jobs. The rest of the world is catching up.'"

THE RESPONSE

Tech Prep's intent is to create a coordinated secondary/postsecondary curriculum that will give program completers the basic and technical skills necessary to compete in the global marketplace. The goal, then, is to create a better educated workforce, with "better educated" being defined as possessing knowledge and skills that are more relevant to the circumstances existing today and in the foreseeable future.

OUR STATUS

One of the pioneering influences of Tech Prep was Dale Parnell, who identified a group of students to whom he referred as "the neglected majority." Parnell noted that fewer than a quarter of high school students were in the high school College Prep track, and fewer than a quarter of the students were in vocational education; this translated into having a majority of the high school population residing in the educational wasteland of the *general track*.

WHY MORE THAN COLLEGE PREP?

The Tech Prep secondary curriculum includes the content of the College Prep curriculum. If this is the case, one might ask why a track other than college prep is needed. In Tech Prep, the tracks don't exist. Career pathways provide opportunities for success at multiple points. Each career pathway includes preparation for college and other entry points to employment careers.

Real growth in the labor market is in fields that require advanced skills and technical training with or without a baccalaureate degree. Career paths prepare all students.

A CRISIS?

Dale Parnell discusses the changing needs of education in his book, *The Neglected Majority*:

"Are we creating the crisis of the 1990's by indiscriminately imposing baccalaureate-degree program standards upon high-school graduation requirements? Is this the answer to improving the high-school education of the ordinary student? It may motivate some

students, but surely it will discourage others. When seventy-five percent or more of our high-school graduates do not complete the baccalaureate degree and twenty-five percent of those who begin high school do not even finish, one must question the validity of the current educational program for the great mass of individuals in the middle quartiles of the typical high-school student body. . . .

"Comprehensive high schools and comprehensive community, technical, and junior colleges *must be* concerned with improving the educational program and performance of the ordinary student along with the baccalaureate-degree-bound student. It is not an either/or proposition."

EXPANDING OPPORTUNITIES

Tech Prep actually creates options for students. At the most basic level, the high school curriculum helps students develop the foundational skills necessary to become a lifelong learner. These skills will enable graduates to seek entry-level employment, where they can receive specialized training from their employers. Also, they have the basic skills necessary to learn how to apply new technologies as they are introduced into the workplace.

Alternatively, high school graduates may choose to continue their formal education in a community college program that is designed to help them develop higher levels of technical skill proficiencies. Because this program is coordinated with the high school curriculum, it builds upon the knowledge and skills the student developed while in high school.

EQUAL RIGOR

Finally, because career pathways include the academic requirements of college prep, students may select a baccalaureate program. Some potential problems might occur as the state colleges and universities implement the revised college admissions requirements--for example, a student might have two years of technology courses rather than a foreign language--but the student will have the necessary preparation in the academic basics.

The foundation skills in math, science and communication are every bit as important for the developing technical careers as they are for the baccalaureate-bound student; thus, the curriculum must be at least as rigorous. It is the way the student applies those skills that is different. This difference is a hallmark of Tech Prep--it is learning in context: the courses "apply" realistic examples and problems taken from industry.

PROMISING EVIDENCE

Some preliminary assessments of the applied basics courses that are being developed as part of the Tech Prep initiative suggest that the content of these courses meets or exceeds that of their College Prep equivalents. Further, because the courses rely heavily on application, teachers are reporting that comprehension and retention seems to be much greater. Of course, these initial assessments need to be validated through formal research projects, but the results certainly appear to be promising.

"Promising" is perhaps the best catchword for the Tech Prep curriculum. Tech Prep is meant to complement College Prep, not to replace it or subvert it. Tech Prep provides students with meaningful educational and career options. Tech Prep is intended to prepare students for the challenges of the global workplace, and the technologies that are rapidly transforming work processes.

* * * * *

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Parnell, Dale, *The Neglected Majority* (Washington, D.C.: Community College Press), 1985, pp. 16-17.

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TECH PREP, HOW TO GET STARTED

After becoming aware of the need for Tech Prep, it is time to get started. When this time comes it is difficult to know what to do first. This issue provides a step by step guide.

IDENTIFICATION
WHAT IS TO BE ACCOMPLISHED

a. Read, discuss, review. Look at other projects. What fits your situation? What needs to be corrected?
b. Write down the intended direction!
c. Create discussion groups of teachers, counselors, administrators, and/or business persons.
d. Finalize objectives.

AWARENESS
CREATE IT IN YOUR SCHOOL

a. Provide discussions/presentations on the program. Help others to understand the concepts and benefits.
b. Get administrative support--in writing.
c. Get business support--in writing.
d. Get faculty support--in writing.

PROMOTION
JOIN WITH OTHER SCHOOLS

a. Do faculty workshops.
b. Present on in-service days.
c. Create secondary/post secondary committees.
d. Identify curriculum areas for joint review.
e. Identify curriculum areas for self review.

AGENDAS
SET UP FOR COMMITTEE WORK

a. Review academics in occupational programs (integration of academics).
b. Review curriculum for duplications, similarities, differences.
c. Review levels of instructions for repetition.
d. Identify desired entrance standards.
e. Review applied basics.

COMMITTEES
FACULTY, GUIDANCE, BUSINESS, AND ADMINISTRATION

a. Limit to one field for discussion (e.g., auto technology, heating/air conditioning).
b. Include secondary and post secondary.
c. Think of common competencies for Technical, Health, or Business.

SET THE COMMITTEE AGENDAS

a. Turf
b. Length of program
c. Placement of offerings
d. Student ability levels
e. Resource allocation
f. Curriculum, standards, evaluation

PUT PROCEDURES IN WRITING

a. Agreements
b. Marketing
c. Budget sharing
d. Public relations

I.D. STAFF DEVELOPMENT ISSUES

a. Faculty
b. Guidance
c. Administrators
d. Clerical/record keeping

ALWAYS

a. Take minutes.
b. Report to everyone.

POSSIBLE COMMITTEES

ADMINISTRATION to develop guidelines, procedures, agreements; resolve issues; coordinate meetings; provide financial support.

CURRICULUM to develop competencies; design linkages in curriculum; develop criteria for articulation; establish evaluation criteria; identify academic criteria.

COUNSELING/RECRUITING to prepare career awareness programs; ensure records transfer; develop handbook for students and parents; assist in public relations.

INFORMATION AND PROMOTION to ensure all parties are informed via various media.

EVALUATION AND IMPROVEMENT to measure success of goals; establish schedule and time frame; review for quality control.

THINGS TO REMEMBER

1. Less than 30% of American youth earn college (baccalaureate) degrees.

2. Most high school students in the middle two quartiles are *bright, capable, underachieving,* and interested in a reasonably high standard of living.

3. The "Forgotten Half" of our high school students who don't have an educational or career plan; they have been leaving high school (before and after graduation) *unprepared for either work or more education*.

4. Most jobs (in business, health, technical and service fields) *don't require a baccalaureate degree*; but they do require strong academic skills and a technical education with an associate degree.

5. Tech Prep/Associate Degree (TPAD)--the new alternative to College Prep--provides the middle 50% of our high school students with a *"respectable"* plan they can begin in high school and complete in two years of higher education.

6. Tech Prep students strengthen their foundation skills in math, science and English through "applied academic" courses.

7. Post Secondary TPAD students may:

- Complete the TPAD program in two years or less at community or technical college.
- Enter full-time employment, and complete the program part-time or later.
- Change their plan and enter a four-year college or university.

USE OF TECH PREP FUNDS

Missouri's interpretation of the Tech Prep legislation limits the use of Tech Prep funds. Funds may not be spent directly on *programs* preceding the 11th grade. However, the money may be used for in-service activities, curriculum development, guidance (including prior to the 11th grade), and program coordination for the last two years of high school and the first two years of college.

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N•E•W•S•L•E•T•T•E•R 2. A

MATHEMATICS

Is mathematics in Tech Prep different? How can basic concepts change? Can math concepts remain while the methods of presentation are transformed?

Mathematics is unique because it can be studied in total isolation from everything else. However, less than 10% of a typical group of students are able to transfer isolated, abstract ideas to functional applications without help. For the typical 90% of our population, applying math to useful purposes is a requirement for true learning and retention.

MATH IN TECH PREP

Tech Prep initiatives focus on the economic and social needs for mathematics. Employers need workers to apply math functions to productive ends. As students accept adult roles and responsibilities, mathematics must be applied to daily activities.

Applied Mathematics is the name of a math curriculum published by CORD (see Definitions and Resources, newsletter 1-C). It is one of the "in-context" curricula that delivers objectives through valid, useful activities and examples rather than abstract, unrelated ideas.

APPLIED MATH

This is one of the best approaches to students learning mathematics. It conforms to the latest recommendations of the National Council of Teachers of Mathematics. Mathematics is made relevant by using problems that are found in the work place.

DIFFERENCES IN APPLIED MATH

Applied mathematics is different because it recognizes the need for students to engage and solve problems that are real. The problems are *all* word problems (not rows and rows of isolated problems). Further, these problems are grouped into categories. The groups include agriculture and agribusiness, business and marketing, health occupations, home economics, industrial technology, and a general applications group.

APPLIED MATH TEXT BOOKS

Applied mathematics is written in a *modular* format. This means a different text-booklet covers each topic. This way, teachers can more easily individualize the instruction. If necessary, students can work on different objectives at the same time. A single topic may be selected for a particular student or group of students needing instruction on a specific area.

The sequence of topics is adaptable. All booklets do not necessarily need to be taught in numerical order. This allows for significant flexibility with students and cooperation with teachers.

APPLIED MATH and COLLEGE PREP

Applied mathematics is *not a watered down version* of general mathematics or another form of "functional" math. Some schools already using this curriculum report significant results. For example, in a recent study at

Green County Schools in North Carolina, students completing a portion of *Applied Mathematics* tested equal to Algebra I students.

APPLIED MATHEMATICS is A LAB CLASS

A significant amount of research in education supports learning through classroom *experiences*. This curriculum has three lab experiences for every unit. The lab equipment is designed to keep the students involved and motivated. Most of the activities use the same equipment found predominately outside schools.

Many units are taught in about six sessions. Session one is an overview of the unit showing the video, discussing the problem and working through it. Sessions two and three involve written information and the examples given. In sessions four and five students work on lab activities and problem solving exercises. Three to five people in each lab group is best. Session six is a review and unit test.

APPLIED MATHEMATICS HAS CONTENT

The 36 units are:

= = > APPLIED MATHEMATICS I < = =

A. Getting to Know Your Calculator
B. Naming Numbers in Different Ways
C. Finding Answers With Your Calculator
1. Learning Problem-solving Techniques
2. Estimating Answers
3. Measuring in English and Metric Units
4. Using Graphs, Charts, and Tables
5. Dealing with Data
6. Working with Lines and Angles
7. Working with Shapes in Two Dimensions
8. Working with Shapes in Three Dimensions
9. Using Ratios and Proportions
10. Working with Scale Drawings
11. Using Signed Numbers and Vectors
12. Using Scientific Notation
13. Precision, Accuracy, and Tolerance
14. Solving Problems with Powers and Roots
15. Using Formulas to Solve Problems

= = > APPLIED MATHEMATICS II < = =

16. Solving Problems That Involve Linear Equations
17. Graphing Data
18. Solving Problems That Involve Nonlinear Equations
19. Working with Statistics
20. Working with Probabilities
21. Using Right-triangle Relationships
22. Using Trigonometric Functions
23. Factoring
24. Patterns and Functions
25. Quadratics
26. Systems of Equations
27. Inequalities
28. Geometry in the Workplace 1
29. Geometry in the Workplace 2
30. Solving Problems with Computer Spreadsheets
31. Solving Problems with Computer Graphics
32. Quality Assurance and Process Control 1
33. Quality Assurance and Process Control 2

NOT JUST "EVERY DAY" MATH

Applied mathematics includes problems that may be seen in everyday life but its true emphasis is on problems that will be encountered in work situations. Most of the problems involve multiple steps. They also involve selecting (sorting out) the data that is relevant.

COMPLIMENTING OTHER CURRICULUM

Applied mathematics compliments other courses and curricula like Principles of Technology, biology/chemistry, most business and industrial technology courses, as well as other vocational courses. It shows students the concrete value of being able to use math in order to accomplish worthwhile tasks.

ADDITIONAL INFORMATION

For more information, contact:

- Department of Elementary and Secondary Education, P. O. Box 480, Jefferson City, MO 65102, 314/751-3524.
- MVRC/IML, University of Missouri, 10 Industrial Education Building, Columbia, MO 65211, 800/392-7217

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N • E • W • S • L • E • T • T • E • R 2, B

COMMUNICATIONS

The word *communications* is used here to describe all that is included by the terms reading, writing, speaking, listening, conveying, negotiating, learning, teaching, etc. It includes many topics usually contained in English and language arts classes.

IT'S DISTINCTIVE

Communications in Tech Prep has a distinct focus when compared to typical classes. In most traditional classes it is assumed that a student capable of writing a short story is instinctively capable of writing a memorandum. It is a widely accepted misconception that by concentrating on creative writing, a student's ability to write technical, business, or other work-based communication is automatically covered.

TEACH IT!

A few decades ago a debate occurred trying to determine the validity and usefulness of requiring Latin in a curriculum. One of the strongest arguments *for* requiring Latin was that it helped students increase their ability to understand and use English. Research finally put the argument to rest by concluding that if we want students to learn English, *teach English*. Communications for Tech Prep uses the same logic . . . if students need to know how to read, speak, write, listen, learn, and do all the other communications-based activities to be productive in a work-based setting then *teach those skills in the school-based setting*. The vast majority of students do not learn work-place skills when only taught in the abstract.

AN ADAPTIVE CURRICULUM

Applied Communications is an adaptive, comprehensive, outcomes-based curriculum with a unique set of learner-focused materials. This curriculum presumes that communications skills are best learned through practice and application in a *meaningful* context.

CURRICULUM PURPOSES

- Teach communications, language arts, and English skills as they apply in the workplace.
- Sharpen reading, writing, listening, speaking, problem solving, visual, and non-verbal skills.
- Strengthen the academic foundations of all curricula.
- Feature applications for business, marketing, technical and industrial trades, health careers, and agribusiness.

APPLIED COMMUNICATIONS

One set of communications curriculum has been developed at AIT (see Definitions and Resources, newsletter 1-C). It is a series of modules, both print and video (tape or disc), that can be integrated into other courses or offered as an alternative to traditional English courses.

The instructional materials are divided into 15 instructional modules, each with ten lessons (40 to 55 minutes). The modules can be used individually and in any order. They can enhance existing communications, language arts, English, or other courses whose prime focus is something other than language arts. Additionally, the modules can be used to make a separate, distinct course. However, most practitioners are *infusing* the modules into classes already offered.

THE DESIGN

Student materials in *Applied Communications* are written at an eighth grade reading level. The communication skills are taught using models that include the challenges and responsibilities of the workplace. This activity-oriented approach appeals to a variety of *learning styles*.

With these designed-in activities, students learn by practicing and experiencing useful, functional communications. These experiences include a variety of situations and require students to converse with others as they participate in meetings, write memos, letters, and reports, and interpret technical information (e.g., graphs, charts, tables).

THE MODULES

- Communicating in the Workplace
- Gathering & Using Information
- Using Problem-Solving Strategies
- Starting a New Job
- Communication with Co-Workers
- Participating in Groups
- Following and Giving Directions
- Communicating with Supervisors
- Presenting Your Point of View
- Communication with Clients & Customers
- Making and Responding to Requests
- Communicating to Solve Interpersonal Conflict
- Evaluating performance
- Upgrading, Retraining, and Changing Jobs
- Improving the Quality of Communications
- Technical Writing
- Electronic Communication

FLEXIBILITY

The communication curricula can be used in a multitude of ways. Specific modules can be incorporated into current classes. Students can experience roles. For example, students may "role-play" a person who is responsible for a computer program, legal document, automobile, computer, furnace, car stereo, or a multitude of other examples. In this type of example many activities need to be handled correctly (e.g., making and/or following work orders or other directions, documenting what was done, notifying people responsible for billing, accounting, inventory).

SPECIFIC ACTIVITIES

The basic information concerning the need for following directions and guidelines will be similar, but may vary when a student's interests are taken into account. Distinct activities can be used when a student's particular interest is known. This may affect items such as scheduling, activity planning, and locating resources. Both students and instructors need to be willing to share experiences and knowledge to make a success of these individualized activities.

STUDENT RESPONSES

Some schools have used several of the modules described above. Teachers report being particularly pleased with student learning and increased abilities. Another sign of success is hearing students tell other students about a particular activity or project that was *genuinely useful and fun*.

GREAT RESOURCES

One activity has always been especially beneficial: having employers come and speak to students. Different individuals can discuss the varying aspects of communications that are critical to their business's success. This opportunity causes students to have direct contact with potential employers and provides independent confirmation of skills the teacher is asking students to learn.

Other resources from supportive businesses include the materials that may be obtained for students to use. These could be forms to complete or employee handbooks (policy manuals) to interpret. Either way, the activities are relevant to the business setting.

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N • E • W • S • L • E • T • T • E • R 2, C

BIOLOGY / CHEMISTRY

Like the other curricula in this newsletter section, the biology and chemistry discussion deals with both method and substance. Another way of saying this: biology and chemistry in Tech Prep is as much a reform of the process (of learning) as it is the product (or content) of the curriculum.

BIOLOGY/CHEMISTRY

Biology and chemistry are examples of the academic courses at the core of Tech Prep. They are designed to be challenging lab science courses: rigorous in content, relevant in application, meaningful to students, and pertinent to a lifetime of use.

Biology and chemistry are usually taught separately. The Center for Occupational Research and Development (see CORD in newsletter 1-C) has developed a curriculum, Applications in Biology/Chemistry, (or ABC) that takes advantage of the natural connections between these two sciences. Typical high school classes keep biology and chemistry separate. With ABC, however, these two curricula are woven together through activities in which all students participate.

THE APPLICATION

Through the AB/C curriculum, students experience many activities which require critical thinking and problem solving skills. By design, these classroom and laboratory activities are relevant to students' lives. They relate to important topics in society, the workplace, and at home.

THE STRUCTURE

ABC is two years in length with more than enough activities to fill the time. The units of instruction are designed around relevant issues. Study of these issues requires good biology and chemistry. It is rigorous.

Year one topics:
- Natural Resources
- Air and Other Gasses
- Water
- Continuity of Life
- Nutrition
- Disease and Wellness

Year Two Topics:
- Plant Growth and Reproduction
- Microorganisms
- Life Processes
- Synthetic Materials
- Waste and Waste Management
- Community of Life

THE TEACHER(S)

Several successful courses integrating biology and chemistry have been team-taught by 1) a science teacher and 2) a teacher from a discipline where the knowledge and skills of biology and chemistry are employed (e.g., medical/health, technology, family living, agriculture, and others).

The AB/C curriculum is quite flexible. It is capable of being used as a lab-science course by itself. Additionally, it can be infused into other science or non-science classes. The curriculum can be one or two of the science

offerings at a high school, or it can be used to supplement non-science-credit high school or vocational courses.

STUDENTS

The instructional materials have been designed for the middle two-thirds of the high school student body. Activities, labs, and case studies make AB/C interesting to students who: do not normally like science, do not usually do well in science, and students who do not feel confident in their science abilities. The challenging academic content is made relevant due to the contextual nature of the course--40 percent labs with at least one activity in every sub-unit. The curriculum materials also include video tapes which show people with careers in science and link the topics of the class to *life*. This program is designed to teach the critical thinking skills, problem solving skills, cooperative skills, and analysis skills needed by *all* students.

PREREQUISITES

The reading level in the ABC curriculum is eighth grade. The course also assumes students have been exposed to some science content (usually taught at the junior-high or middle-school grades).

CREDIT

The biology/chemistry curriculum matches approximately 80 percent of the MMAT science objectives for grades nine and ten. This curriculum fits into the traditional high school at any level, but when the entire two year curriculum is used, it usually is a freshman/sophomore or sophomore/junior sequence.

The curriculum may be used to replace biology, general or (with some modification) physical science. It also may be infused with these existing classes. When supplemented with specific topics, essentially all MMAT competencies are addressed.

INCLUDED

- Video
  - -introduces topics
  - -motivates through real-world connections and role models
  - -instructs
  - -supports problem-solving activities
  - -summarizes
- Student Text
  - -"kicker" activity
  - -scenarios
  - -job profiles
  - -text
  - -activities
  - -labs
  - -glossary
- Activities
  - -hands on analyses, observations, simulations
  - -surveys and interviews
  - -skits and role-playing
  - -research
  - -data analysis
  - -data compilation, charting, graphing
  - -technical reports
  - -reference charts, flow diagrams
  - -distinguishing fact from opinion

BY DESIGN

Applied biology and chemistry will:

- Integrate Biology and Chemistry
- Teach by application
  - -activities
  - -adult roles
  - -occupational settings
- Address current issues
  - -occupational
  - -societal
  - -personal
- Develop higher-level thinking skills
- Teach students to *use*, not just *recite* principles
- Maintain the integrity of good science *(AB/C is not watered down)*

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N•E•W•S•L•E•T•T•E•R 2, D

PRINCIPLES OF TECHNOLOGY

Over 80 percent of the jobs in the United States require a functional understanding of science and technology. However, over 80 percent of our high school students do not acquire even a basic understanding of the technologies in their lives, let alone an ability to control, analyze, synthesize, or evaluate technology. The concepts in Principles of Technology are concepts of physics, and physics is the infrastructure of technology.

CONSIDER

Students usually take physics only after taking biology and chemistry. Does success in physics depend upon knowledge of biology and chemistry? Do students have to have Algebra II, geometry, math analysis, and trigonometry to enroll? Are the vast majority of our students who do not take physics incapable of understanding the technology affecting their jobs and the rest of their lives?

TECHNOLOGY

Technology will continue to impact nearly all jobs. It will eliminate some and create others. Today's workforce (college educated or not) is confronted by diverse, complex, and rapid technological changes. Technology is driving a large wedge between low-skill/low-wage jobs (which may or may not stay in the U.S.) and high-skill/high-wage jobs.

Few skills are essential for survival. Yet, for a good living standard, *technological literacy is a must.* Principles of Technology contains critical information and develops crucial mental abilities. Concepts of physics are used more universally (on the job and in life) than any discipline except English/communications.

PHYSICS AND PRINCIPLES OF TECHNOLOGY

Technology is the application of one or more scientific principles. Therefore, the principles involved in technology have their foundation in one or more of the sciences. Principles of Technology (PT) is rooted in physics (it is physics). The PT curriculum focuses on the usefulness of physics concepts. The title could just as easily be used for courses implementing chemistry, biology, or other sciences. This course, however, was developed around physics by CORD (see newsletter 1-C).

THE DIFFERENCE

A significant difference in PT is the constant focus on the *applications and usefulness* of physics. Years of college-prep math are not prerequisites, although significant math skills are developed as students work through many lab and other PT activities.

The method used in PT is a basic tenet of education: when teaching a new concept connect it to as many meaningful experiences as possible. PT uses *analogies* as the fundamental vehicle for learning new information. Once concrete examples are established, the PT curriculum stretches the student to unique applications. This concrete to abstract sequence meets the needs for 80

to 90 percent of the student body that learn best from examples first followed by abstract concepts next.

PHYSICS WITHOUT YEARS OF MATH?

Not everyone is going to be a physicist Many colleges offer several levels of physics courses. At some colleges, physics courses may be categorized by the level of math used: 1) arithmetic, 2) algebra, and 3) calculus. The physics is the same, the math is different.

As schools have developed curricula over the decades, college-prep physics (always the last science to be studied) took advantage of the fact that students had at least two, probably three, years of high school math prior to taking physics. It doesn't have to be that way, but we accept it as a part of the high school structure. That was fine for earlier decades. However, in today's global and complex economy, all students need the ability to comprehend and apply the scientific laws contained in basic physics.

PT VS. OTHER SCIENCE CLASSES

Are the principles of physics more important than principles in other science classes? Certainly not! Perhaps, however, the question should be, "Is physics always the least important class?" Right now it is the science class taken last. Typically students have three units of science before physics is available; few students make this selection.

A LIFELONG IMPERATIVE

The world is a sophisticated, rapidly changing society. We are increasingly dependent upon an understanding of technology to make informed decisions about the equipment in our homes and offices, about the operation (and maintenance) of complex devices, and about community issues.

Modern technology requires not only currently employable skills, but also an understanding of concepts that will not become obsolete as the workplace and technologies change. Understanding physics, biology, and chemistry is vital. Principles of Technology addresses the physics.

FACTS ABOUT PT

- One or two years (7 or 14 units) in length
- 140-150 classes (50-minutes) per year
- 74 video programs (700 minutes total)
- 90 laboratory applications
- 18 developmental math skills labs
- 46 rigorous mathematics labs

A typical unit of instruction
- 6 video segments (40-50 minutes total)
- About 135 pages of student text
- 8 laboratory applications
- 4 classroom-wide demonstrations
- 270 (approximately) pages of teacher text

For the Teacher
- Instructor's manual with notes and solutions (not just answers) on one page and exact copies of student text on the next page.
- Summaries of the video segments with discussion questions covering each one.
- An entire curriculum designed to convey the usefulness and application of the concepts.

THE UNITS

- Year One
  - Force
  - Work
  - Rate
  - Resistance
  - Energy
  - Power
  - Force Transformers

- Year Two
  - Momentum
  - Waves and Vibrations
  - Energy Convertors
  - Transducers
  - Radiation
  - Optical Systems
  - Time constants

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N • E • W • S • L • E • T • T • E • R 2, E

WORKPLACE APPLICATIONS

The term "workplace applications" can include a number of topics. Recent reports and studies have addressed the need for workers to be knowledgeable in the areas of basic skills, communications, self management, information processing, computer applications, team work, problem solving and various other competencies.

This newsletter will center on the findings and recommendations of reports prepared by the Secretary's Commission on Achieving Necessary Skills (SCANS) and the work readiness materials developed by the Agency for Instructional Technology (for both SCANS and AIT, see Definitions and Resources, newsletter 1,C).

WHY BE CONCERNED WITH WORKPLACE APPLICATIONS?

Feedback from the employer community indicates that the globalization of the economy and the expansion of technology in the workplace produces the need for a high performance and competent worker if America is to compete in the international marketplace. There's little evidence that schools presently provide a planned program for preparing and transitioning students into this new "World of Work".

The important fact is that workplace readiness skills are needed by all students, both those going to work and those planning some type of postsecondary educational experience. *Everyone* will go to work *sometime.*

THE **SCANS** FINDINGS

SCANS chose the term "Workplace Know How" to describe the skills it found to be needed by workers. Their research isolated five competencies and three foundation skills that workers should possess. These requirements were validated by a cross section of the nation's business, industrial, and educational leaders. The report further stipulated that these eight requirements should be taught "in context" so that students learn the practical applications and be able to transfer the knowledge and skills to the real work environment.

WORKPLACE KNOW-HOW
(in the high-performance workplace)

The essential know-how identified by SCANS is composed of five **competencies** and a three-part **foundation** of skills and personal qualities that are needed for solid job performance.

WORKPLACE **COMPETENCIES**

Effective workers can productively use:

Resources--They know how to allocate time, money, materials, space, and staff.

Interpersonal skills--They can work on teams, teach others, serve customers, lead, negotiate, and work well with people from culturally diverse backgrounds.

Information--They can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.

Systems--They understand social, organizational, and technological systems. They can monitor and correct performance, and they can design or improve systems.

Technology--They can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

FOUNDATION SKILLS

Competent workers need:

Basic Skills--reading, writing, arithmetic and mathematics, speaking, and listening.

Thinking Skills--the ability to learn, to reason, to think creatively, to make decisions, and to solve problems.

Personal Qualities--individual responsibility, self-esteem and self-management, sociability, and integrity.

A CURRICULUM

AIT is one group which has produced a multi-media curricula package that addresses a number of the SCANS requirements. It is entitled "Workplace Readiness" and provides three *instructional units*:

- Teamwork
- Self-Management
- Problem Solving

THE CURRICULUM DESIGN

The materials are presented in three different *media formats*:

- Level 1 videodiscs
- VHS videotapes
- IBM or Macintosh software

FLEXIBILITY

The material may be used as single units in any class or all together in a one semester course. Learners build skills through real and dramatized work situations. All three units have instructor and learner guides. A fourth unit is an implementation guide for instructors.

CONTENT OF UNITS

Teamwork Modules
- The Changing Workplace
- What is an Effective Team?
- Shared Leadership
- Diversity in the Work Force
- Conflict Resolution

Self-Management Modules
- The changing Workplace
- Personal Performance
  - Taking Responsibility
  - Evaluating Performance
  - Recognizing Consequences
  - Policy and Procedure
  - Solving Performance Problems
- Personal Transitions
  - When to Start
  - Adjusting to Change
  - Work Values - What's Important
  - Profiles in Change
  - Applying the Problem Solving Approach
  - Forming your Action Plan

Problem Solving Modules
- The Changing Workplace
- Defining the Situation
- Stating the Goal
- Identifying a Solution
- Preparing a Plan
- Taking Action

PREVIEW MATERIALS THROUGH . . .

AIT Customer Service, Box A, Bloomington, IN 47402, 800/457-4509, FAX 812/333-4278

MVRC/IML, 10 Industrial Education Building, Columbia, Missouri 65211, 800/392-7217

Metropolitan Community Colleges, 3200 Broadway, Kansas City, Missouri 64111, 816/759-1167 or 816/759-1208

RECOMMENDED REFERENCES

The SCANS publications: 1) "What Work Requires of Schools," 2) "Learning a Living: A Blueprint for High Performance," and 3) "Teaching SCANS" may be obtained from the U.S. Government Bookstore, #120 Bannister Mall, 5600 E. Bannister Road, Kansas City, MO 64137, 816/756-2256.

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PREPARATION FOR BUSINESS

CHANGES IN BUSINESS

Business programs are being redefined by the impact of (1) higher graduation requirements, (2) fewer secondary students, (3) cost of equipment, and (4) lack of in-service programs for instructors. Direct skill development is giving way to basic education programs and preparation for post-secondary instruction. Skills required by business for entry level tend to be centered on *understanding basics*, the *desire to continue learning*, *flexibility*, and *adaptiveness*. Although machine-operational skills are necessary, they are receiving less emphasis when evaluating business student applicants.

THE BUSINESS CURRICULUM

Concentration will be on the "academic" as well as basic business knowledge. Computers, accounting, management and information services blended with communications, mathematics, economics, and complimentary electives are becoming part of the business curriculum. The traditional "office" preparation at the secondary level will be replaced by basic business education and a foundation for other training.

TECH PREP FOR BUSINESS

"Business Prep" is similar to other Tech Prep concepts except the core programs lend themselves to business. Math applications, communications applications, and computer applications are targeted toward business understanding. Students are expected to use the computer as a device for solving problems rather than only knowing how to operate it. Software is a tool rather than an end in itself.

A SAMPLE 2 + 2 BUSINESS PROGRAM

Grade 11
- assess basic skill understanding,
- develop basic skills through application,
- understand basic computer operation and concepts,
- utilize teamwork concepts and personal development,
- understand resources, and access to them.

Grade 12
- review purposes of business and business organization,
- apply computer operations and concepts to practical business problems,
- explore applied economic applications,
- apply basic skills to problems,
- acquire problem solving techniques,
- explore "real world" applications through observation, conversation, or work.

Grade 13
- target specialty interest areas: accounting, information, computer applications, etc.,
- advance (elevate) general and basic skills competencies,
- apply advanced computer concepts to business applications,
- broaden understanding of other business fields,
- apply problem solving techniques.

Grade 14
- specialize in one field,
- apply computer to specialty,
- advance (elevate) basic skills to specialty requirements.
- experience "real world" situations by work and projects in specialty field.

INTERMEDIATE GOALS

Grade 11
- prepare for further education,
- prepare for exit to job in basic computer operations (e.g., word processing or in basic office assistance).

Grade 12
- prepare for further education,
- prepare for exit to job in basic computer operations (e.g., word processing, spreadsheet, and database).

Grade 13
- prepare for further education,
- prepare for exit to job in basic or advance computer applications,
- prepare for exit to job in targeted area applications.

Grade 14
- prepare for further education,
- prepare for exit to job in advanced computer application in targeted area.

SPECIALTY AREAS IN BUSINESS

Work place readiness for business students at the secondary or community college level should concentrate on information, computer applications, accounting management, and customer services. Jobs in these areas include assistants to administrations, to accounting, to bookkeeping, to management, to computer services, and many others in all facets of business.

Traditionally these were known as clerks, secretaries, record keepers, entry operators, etc. Those titles are becoming obsolete as job skill requirements become more and more alike for each job.

COMMON JOB SKILL REQUIREMENTS FOR BUSINESS JOBS

1. Computer literacy and software application.
2. Communications ability; oral, written and listening.
3. Math understanding and applications.
4. Working with others and getting along.
5. Initiative and work ethic.
6. Understanding business purposes and motives.

BUSINESS vs. CONSUMER BUSINESS PROGRAMS

Home computer applications, literacy, input, mechanisms, software understanding, personal communication devices, accessing information, home office networking, and recordkeeping with a PC are a few of the consumer education programs necessary for personal understanding and everyday use of computers. Job training is important to business education, however, consumer training will be a much larger need as technology progresses.

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N O T E

- *Business education will train 70% of the workforce buy the year 2000;*
- *Without experience, students can expect entry jobs only;*
- *Intermediate jobs will come with experience and more education;*
- *Advanced jobs will come only with advanced experience.*

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PREPARATION FOR HEALTH

Recently a report from a commission under the Missouri Hospital Association expressed concern that education and training of health care professionals was not keeping pace with the evolving health needs of the American people. The focus of the health career cluster is to ensure that today's students will thrive as practitioners in tomorrow's society.

SURPRISING OCCUPATIONS

Health care opportunities have grown significantly in recent decades. However, "doctors" and "nurses" are the only occupations most of the population can identify when asked about health care.

The fastest growing sector of health care occupations are those other than doctor and nurse positions. Nevertheless, few students know the duties, skills, and educational requirements for jobs such as audiologist, cytotechnologist, nuclear medicine technologist, respiratory therapist, physical and occupational therapist, radiation therapist, surgical technologist, pharmacy technician, and many more.

MORE THAN A CLASSROOM

Most students and many educators are not aware that some of these health care positions receive formal education through on-the-job training *if sufficient school courses have been taken.* Others positions require post secondary certificates, associate degrees, or other specific training. A few require experience found only through jobs as an "assistant" to people already in those positions. Some require a four-year degree.

A GENUINE CAREER

Health careers generally start near $15,000 per year and have stable, progressive career pathways. The exceptions to this pay level are jobs that do not require knowledge or skills beyond a high school diploma.

All careers with a reasonable expectation of a good lifestyle and an ongoing career have certain qualifications. Health careers are no exception. Knowledge and skills in the areas of biology, anatomy, physiology, psychology, sociology, and physics are necessary. Attaining these competencies must begin in high school or even middle school. Completing this knowledge and set of skills will require not only post secondary education, but also a job in health care that can provide much needed experience.

INFORMED DECISIONS IN SCHOOL FOR A CAREER IN LIFE

Students cannot make informed decisions about preparing for a career if they know nothing about that career. Reality is generally at odds with a student's perception of a job's activities and working conditions.

Today, a health occupations student must have significant levels of knowledge and the skill to apply that knowledge in biology, chemistry, mathematics, and in many cases physics upon completion of high school.

Once these skills are in place, certain health careers, with only one year of post secondary education, start at $20,000 to $26,000.

RECOMMENDATIONS

A recent committee (including members of the Kansas City Area Hospital Association) made recommendations for high school students who expect to be able to enroll in classes for health science programs. These recommendations expect students to be competent in math, biology, chemistry, and physics. Additional recommendations included computer applications, sociology, psychology, and a foreign language.

DEMONSTRATED SUCCESS

Students receiving a proper orientation to health care professions are quite successful pursuing good careers. One study from the Baylor College of Medicine and the Houston Independent School District completed follow-up studies 15 years after high school graduation. Over 64 percent of the responding graduates maintained career and educational objectives corresponding to the school's curriculum.

CHANGING ACCREDITATION FOR ALLIED HEALTH

Many changes are occurring in the health care educational system. The American Medical Association has announced a new accrediting agency for allied health education due to changing and increasing professionalism in the health professions. By November 1993, a new agency will be in place.

The Missouri Coordinating Board for Higher Education (CBHE) has voted to adopt major policy changes. One goal resulting from these CBHE changes is to double the number of health career students while changing the admission criteria. These changes are an attempt to keep and graduate more of the students admitted to four-year schools.

ADMISSION STANDARDS

Admission standards will change. High school students must be made aware of the changing criteria. Teachers will have to update curriculum to accommodate new expectations. Elementary and middle schools need to provide information about careers other than physicians and nurses in the health field. High schools must determine the priorities related to today's and tomorrow's careers. Colleges (two and four year) have to keep their expectations and instruction current. *Businesses must continually communicate with (not just make demands of) education.*

THE SUPPLIER AND CUSTOMER

Education is a sole-source supplier of new employees to business. Business is the only customer education has (whether a student goes to college or not, nearly everyone goes to work sometime).

A part of the health-care solution is education's responsibility. Increasing the productivity and maintaining the quality of health care for more of our population will require continual cooperation between the health care business, post secondary education, and elementary/secondary education.

A VITAL LINK

Health care is one of the most vital yet least understood of our educational predicaments. Educators, students, and parents alike have to increase their knowledge about the opportunities and challenges of all health careers.

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PREPARATION FOR TECHNICAL CAREERS

AMERICA 2000: An Education Strategy states, "As steps are taken to better prepare children for schools, we must also better prepare schools for children. . . . (The) efforts to restructure education must work toward guaranteeing that all students are engaged in rigorous programs of instruction designed to ensure that every child, regardless of background or disability, acquires the knowledge and skills necessary to succeed in a changing economy."

THE NEED

The rapidly changing effects of technology on our world clearly point to the need for technological literacy. While all career paths leading to a good standard of living will require technical competence, the technical career path has unique requirements. The overwhelming majority of jobs past the year 2000 will require more technical skills than typical high school graduates have, yet most of these jobs will not require a baccalaureate degree. A part of the answer is improved preparation for technology.

A change in priorities is needed at many levels of the curriculum. Thematic instruction, developed and proven in elementary education for years, should be adopted at all levels. However, the *themes need to be oriented to technology and careers.* Vocabulary, writing skills, interpersonal communications, math, and science can be just as exciting focusing on specific aspects of technology as they can with dinosaurs. Limited resources, especially time in the classroom, mean the priorities must be placed on the most productive topics. Dinosaurs are dead.

Science instruction begins with a knowledge base started in elementary school which is then expanded in middle school, high school, and college. The traditional science curriculum teaches basic theory and concepts that *might be applicable at some future date.* Preparation for technology requires the applications to *begin in the classroom.*

THE *TECHNICAL* DIFFERENCE

Key differences exist between traditional courses and courses needed for technical preparation. While some secondary and postsecondary disciplines have already made adjustments, most curricula do not address technical needs because the required focus on applications relating to actual careers is missing.

Technology is not a derivative of pure science or math. By its very nature, technology is the application of multiple sciences and math. The basics include technical reading and writing, oral and visual communications, physics, chemistry, biology, and math. Each discipline has numerous specialties. A strong foundation is essential for good jobs.

SAMPLING 2+2 IN TECHNOLOGY

Technology is a word with diverse and expanded meaning. Nevertheless, one way to place technology in the system of secondary

and postsecondary education is in this example:

Secondary:

- Grade 11
  - assess basic skills
  - use applied curricula to develop basic skills (Principles of Technology and/or Applied Biology/Chemistry)
  - use media centers and other data sources to develop resource skills and identify specific career options
  - use cooperative methods in the classroom to develop teamwork
  - develop basic computer skills

- Grade 12
  - investigate (in depth) career options
  - continue applied curricula and skill development
  - explore technology issues
  - use problem solving techniques on real issues
  - access genuine application examples through observation, work exploration, or job activities

Postsecondary:

- Grade 13
  - identify technology area of interest (e.g., automotive, printing, etc.)
  - increase skills beyond basic levels
  - further develop relevant computer skills
  - develop understanding of related fields and disciplines
  - apply problem solving techniques to related problems and issues
- Grade 14
  - specialize in career targeted areas
  - expand basic skills to required levels
  - complete genuine projects in career area
  - expand computer skills to required levels

EXPANSION

The technical curriculum is a moving target. At some point formal preparation for the technical careers will have to be expanded in classes earlier than grade 11. At all levels, curricular adjustments need to happen more quickly than the traditional cycles now in place.

Effective courses are designed so students recognize the utility of what they are learning *while they are learning it*. One measure of effectiveness is the question, "Why do I need to know this?" That question should be routinely answered before it is raised.

CAREERS THROUGH COURSE INTEGRITY

Technical careers are those that apply scientific knowledge to useful and productive ends. The preparation for these careers must include practical learning experiences and rigorous content in practical application. Of course, this is valuable for all students.

Solid science, math, communications, and other disciplines are essential in technical preparation and critical thinking. Further, students must have the capability to locate relevant data and apply that data to the problems at hand.

UNLOCKING . . . NOT TRACKING

Career paths should be flexible. Inflexible tracking is not the answer.

- The expectations of students and teachers must be significantly raised through replacement of general-track courses.
- Teachers must be provided with workshops and inservice to increase their confidence and skills.
- The curricula must be designed as a part of a program of studies that emphasizes academic and technical skills.

Courses effectively preparing students for technical careers have high expectations. Instructional methods and strategies consistent with the best research on learning (emphasizing the need for student experiences) must be implemented. Cooperative development of the technical curriculum must occur between secondary and post secondary programs. Nothing else will succeed.

Reference: *Curriculum Update,* November 1992, Assc. for Supervision and Curriculum Development.

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PREPARATION FOR CAREERS

Tech prep advocates ending the separation of the thinkers (college prep) from the doers (vocational). Thinkers must be doers and doers thinkers. Tech Prep is designed to combine the thinking with the doing and to give all students *knowledge and experience* in preparation for work.

Tech Prep causes an increased awareness of technical careers. This awareness needs to be provided for all students. By the year, 2000, 80 percent of new jobs will require education beyond high school, but not a four-year degree.

KNOWLEDGE AND SOLUTIONS

As our work place becomes more and more complicated it will be necessary for all workers to have more knowledge -- to know how and why things work and to have increased ability to apply the knowledge learned to *solve problems.*

Every student needs to know about technology, and needs to able to communicate with others. Everyone needs to be comfortable with numbers and basic arithmetic functions and be able to understand the concept of teamwork. It is also important for current secondary students to understand the demands and the expectations of tomorrow's world as well as be prepared for today's world.

WHAT DOES TODAY'S WORLD LOOK LIKE?

Increased Employer Demands. A recent survey of employers showed that the top two reasons employees are terminated are poor attendance and an *inability to communicate* with supervisors and coworkers. Many employers lament the lack of applicants who can read technical manuals, think on their own, communicate orally and in writing with customers. A poll of executives of Fortune 1,000 corporations indicated that **four out of five respondents say they have, at some point, decided not to interview a candidate solely because of poor grammar, spelling, or punctuation in the candidate's letter or resume.**

Technology is impacting the workplace now: new phone systems with voice mail, advanced hardware (most workplaces today have more PC's than typewriters), energy management systems that are microprocessor controlled, new software packages to install and learn. Technology impacts our lives at home: VCR's that need programming, bills that can be paid by phone, mobile phones, computers, and other electronic devices.

WHAT WILL TOMORROW'S WORLD BE LIKE?

What will the workplace be like when the present secondary students reach twenty or thirty? We know that technology will have an even greater impact on that world than it does now. We know that the changes will occur at a more rapid pace in the next twenty years than they have in the past twenty. Retraining will be necessary whether it is for a more advanced phone system, a new computer related gadget, or for a new career. *Students (we) need to be prepared to expect the unexpected and be flexible in their (our) approach to the workplace.*

The future is not known, but it is known what it will feel like. It will feel just like the awe, the uncertainty, and the displacement felt during the rapid changes of the past.

QUALITY

More companies will soon adopt some form of quality improvement or total quality management. In most quality improvement programs, employees at all levels work in teams or serve on special task forces, thus needing the ability to think through problems, communicate with others, and develop with the team new action plans for solving some of the problems. Numeric ability and understanding of statistical concepts will be important in companies because all the workers will have quality control responsibilities.

SO WHAT DOES IT ALL MEAN

It means that we begin today teaching a broader range of skills. It will not be enough for a worker to have only basic skills or just a basic understanding of mechanical devices. Further, not all high school students go to college right after high school (right now, more than half who go to college drop out). The average number of college credit hours being taken is decreasing. More college students are working while in school, working between semesters, or working between years of school.

Most students will need to acquire marketable skills quickly. Students need a core of high school courses that will adequately prepare them whether they go into the work world, on to college, *or both* right after graduation. Learning must include transferable, marketable skills.

These are trends that will make tech prep and applied academics more and more necessary.

A CHALLENGE

How do we do all this? Kids have more disadvantages than ever before and require more help than ever before. Employers tell us additional effort needs to be spent on basic skills. *Here is the challenge:* kids needing extra help and jobs needing people with extra skills and knowledge.

TRANSFERABILITY

Some colleges and universities will not accept "applied" courses as equivalent to "college prep." It is very important that the colleges and universities accepting our students know that new math curricula are not watered down versions of old courses. Part of the instructor's and counselor's job is to continually communicate with colleges to assure they understand the content behind the courses with new names.

IMPLEMENTATION

Many schools in the state of Wisconsin, rather than having a course in applied math to which some colleges might object, continue to call Algebra I *Algebra I.* Nevertheless, a change in the methodology of teaching the course has been made. Algebraic and other skills are attained, but through a revised instructional technique.

In California and in the Omaha, Nebraska school system, all students take a core of courses and every program has career focus. By dividing students into career clusters (rather than college prep and non-college prep), barriers between academic and vocational faculty are breaking down--students win.

RESOURCE

Tech Prep and Counseling: A Resource Guide. Catherine Chew. Center on Education and Work, Madison, WI 53706. (608) 263-3696.

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ARTICULATION MODELS

Models of articulation provide a framework through which individual classes, clusters of classes, departments, or entire schools can implement a cornerstone of Tech Prep. The models are guidelines. Schools, individual classes, or clusters of classes can use different models even though they are a part of the same school. A fundamental question is used to make such decisions: Which method achieves the ultimate goal? The ultimate goal is, of course, *to get students to know what they need to know, to do what they need to be able to do by the time they leave us*.

Time Shortened Model

The primary purpose is to eliminate unnecessary redundancy in educational experiences in order to grant some type of advanced placement to high school students entering a two-year college program. As a result, students complete an occupational certificate or degree program more quickly than a normal post secondary program would allow. Time shortened articulation does not mean advanced skills only quicker completion.

Advanced Skills Model

This eliminates duplication of training across the secondary-postsecondary levels, but its main purpose is to streamline occupational training for grades in 11-14 in order to incorporate into the curriculum more advanced training than a traditional postsecondary program can achieve. The intention is to graduate students at a master technician level, mainly for industries and businesses adopting high technology. To achieve this, high schools and two-year colleges closely coordinate the curricula at both levels. The students do not complete sooner than usual; they take more courses.

Core Curriculum Model

High school students receive a math and science core curriculum as well as critical literacy and other skills that prepare them for success in a strong, advanced postsecondary technical program. The total curriculum is jointly developed between secondary and postsecondary. This allows basic skill development at the secondary level and advanced skill concentration at the postsecondary level.

2 + 2 Model

Many educators currently use the term "2 + 2" indiscriminately to mean any articulation program, but the vocational-technical "2 + 2" program is one that tightly coordinates occupational training for grades 11-14; two years of high school courses plus two years of postsecondary technical courses.

Vocational-technical "2 + 2" programs tend to involve hand-in-glove cooperation of many kinds between secondary and postsecondary institutions. Usually, they develop a new or completely rewritten curriculum (competency-based) for each technical specialty. They also employ a career ladder approach that enables students leaving the program after grades 12, 13, or 14 to obtain a certificate of competency at the level of completion. Often; schools share vital resources including facilities, instructors, materials, and advisory committees.

2 + 2 + 2 Modules

This usually indicates that a four year degree granting institution is involved. It ties curriculum to a 4-year technical or academic degree in a written agreement between the community colleges and the 4-year school. Ideally a person from grade 11 travels through grade 16 for a coordinated, career degree. Secondary, community college and 4-year personnel are involved in curriculum design, evaluation and resource sharing.

Common Essentials to Successful Models

- Leadership and commitment from the top
- Early faculty involvement
- Relationships based on mutual respect and trust
- Mutual benefits to all partners
- Written articulation agreements
- Open, clear, and frequent communications
- Modest initial goals
- Clearly defined responsibilities
- Competency based curricula
- Common focus on mutual goals, not turf

Things which can be done without a Model

- Sharing facilities
- Contracting courses with other institutions
- Combining enrollments
- Joint enrichment programs
- Experiential learning applications
- 2-year/4-year discussions
- Joint personnel development
- Utilization of discipline expertise at several levels

Other Modules and Ideas

Course to Course Model

Identification of similar courses which equate in content, standard and evaluation allowing a secondary student to "skip" the similar course at the post-secondary level. Although this is very narrow in application, it is usually easier and quicker to achieve than a complete program articulation.

Core to Core Model

This identifies a group of courses or competencies which transfer as a "lump sum" to a credit situation at the postsecondary level. This usually equates to mastery of prerequisites or entrance standards. There is general acceptance of the group rather than isolated courses.

Core to Course Model

This identifies specific courses which are part of a core group which can receive credit or advanced standing at the postsecondary level. Each course or competency of the group is evaluated separately and credit for each one is awarded.

Course to Core Model

This identifies specific courses at the secondary level which equate to pieces of a postsecondary core requirement. Individual assessment of the course accomplishments may be used to satisfy part(s) of the core requirement. Therefore, it would eliminate duplication.

REMEMBER: everyone must believe this is the right thing to do.

The administration of both institutions must actively support articulation by providing: time to meet for faculty members, expense reimbursement for necessary travel, reviews and responses of working papers and draft proposals at meaningful intervals.

The classroom faculty members must be significant participants in the process by helping: draft the ultimate outcomes, determine the sequence or sequences of curricula necessary for students to accomplish the outcomes, determine where and how the learning will take place.

The guidance/counseling staff must be an integral part of all discussions affecting students by assessing: what courses will change, be added, or dropped, what will be the affects on transcripts, how will students and parents be made aware of these changes, how will this affect the options from which students currently choose.

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ARTICULATION: DUAL ENROLLMENT

In the Spring of 1990, legislation was enacted in Missouri (SB 740) which authorized the dual enrollment, dual credit and dual counting for state aid purposes of high school students who attend college courses. This issue provides a summary of that legislation for use in developing Tech Prep delivery systems.

WHAT IS DUAL ENROLLMENT?

Dual enrollment courses are courses offered to high school students which enable the students to receive both high school and college level credit simultaneously.

WHO IS ELIGIBLE?

High school juniors or seniors who are 1) taking at least one course for credit in high school, 2) are recommended by their principal, and 3) are enrolled in post-secondary courses during the normal school day at a Missouri public community college or public or private four-year college or university. In addition, *there must be a written cooperative agreement* between the school district and the college(s) attended by the students.

WHAT COURSES MAY BE OFFERED?

The dual credit courses must be at the *collegiate level*. This means advanced *academic or vocational* courses which duplicate the curriculum offerings delivered to the institution's regular college students (including course content, student requirements, evaluation standards and provisions for academic support).

WHO TEACHES THE COURSE?

Faculty members who teach dual credit courses may be regular, full-time college faculty or adjunct faculty. If adjunct faculty (including high school instructors who may be appointed) are utilized, then they must meet the customary institutional standards for college faculty members teaching similar assignments.

Adjunct faculty should also receive periodic orientation, supervision, and evaluation. This ensures that the institution's expectations regarding the delivery of instruction are met.

WHO PAYS FOR THE COURSES?

Course fees may be paid by the high school district or the student or some combination depending upon the written agreement between the institutions. The textbooks may also be purchased by the high school or the student.

HOW MANY CREDITS MAY BE EARNED?

The statute does not specify a limit on the number of high school credits which may be earned by a student. Each local board of education has the authority to determine the number of units which will be recognized.

Students may earn one unit of high school credit for each 6900 minutes of class time. This equates to approximately one-half unit for a 3 semester hour college course and one-quarter unit for a 2 hour college course.

TRANSFERRING CREDIT

College credit earned from dual credit courses fall under the same Coordinating Board of Higher Education guidelines as all other college courses for transfer of credit.

HOW DO STUDENTS GET TO CLASS?

Local school districts can legally transport students to college classes. The district may directly pay the cost of transportation or share the cost under certain conditions.

CAN CLASSES BE MIXED?

In order to ensure that the course material is presented at a collegiate level, classes with dual credit students and high school credit only students are discouraged. For these "mixed classes", the assessment of student learning outcomes must involve the use of an external evaluation, such as the Advanced Placement (AP) exam, or an institutionally approved assessment instrument.

HOW DOES THE FUNDING WORK?

Since students are enrolled and attending high school classes, they may be counted in the average daily attendance by the school district for state aid purposes. If the dual credit courses are available to all students free of charge, then they also may be counted toward meeting school classification/school improvement program curriculum standards.

Two-year community colleges receive state aid only for courses offered within their taxing districts. A course offered outside the community college taxing district may be eligible for dual credit, but only the high school can count the student for state aid. Four-year public colleges and universities collect state aid only when courses are offered on their campuses.

WHAT ARE THE BENEFITS?

- Reduces duplication of coursework for students.
- Courses counted toward curriculum offering standards of the Missouri School Improvement Program for the high schools.
- Increase in number of students matriculating to colleges.
- Both institutions may receive state aid for the dual enrollment.
- Motivates students to take more challenging courses during their senior year.

ADDITIONAL INFORMATION

- Senate Bill No. 740 (85th Assembly), Section 37.
- Interpretations of this legislation by the Department of Elementary and Secondary Education, PO Box 480, Jefferson City, MO 65102-0480, 314/751-3524
- Interpretations of this legislation by the Coordinating Board for Higher Education, PO Box, Jefferson City, MO 65102, 314/751-2361

RESOURCES

- Gene Schieber, Galaxy Program, Parkhill H.S./Maple Woods C.C., (816) 741-6500
- Gary Noland, State Fair CC AVTS, 3201 West 16th Street, Sedalia, MO 65301 (816) 530-5800
- Ed Gorsky, Missouri Western State College, 4525 Downs Drive, LRC-101, St. Joseph, MO 64507, (816) 271-4217

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WORKING WITH PREREQUISITES

Articulation between schools or individual classes involves expectations of student competence at some level. Certain skills and bases of usable, applicable knowledge are necessary between classes, schools and for entry into Tech Prep.

Prerequisites for Tech Prep will be a moving target. The knowledge and skills required of students two years from now will be different than the knowledge and skills of today's students. Classroom objectives (and other types of educational experience) must refocus and adapt to new or better information on a quicker cycle than is typically the case.

IDENTIFYING PREREQUISITES

Success in the Tech Prep articulation process depends on student competence in fundamental skills. These skills may be categorized in several ways. One method of organizing prerequisites is by the three basics: *reading, writing,* and *computation*. A fourth basic has been added due to technology: research, which is related to the process of *learning-to-learn*.

READING . . .

Reading skills can be viewed at three levels: 1) *basic literacy*--decoding and comprehending written material; 2) *reading-to-do*--reading, remembering (short-term), and processing printed information for immediate use; 3) *reading-to-learn*--reading, storing (long-term), writing, computing, and adapting to achieve solutions and accomplish goals.

The average American worker spends 1.5 to 2 hours reading forms, charts, manuals, electronic displays, and literature. High tech jobs will cause reading to be an even more vital skill. To achieve this prerequisite reading skills can be keyed to the three levels above.

For Tech Prep careers, students need the ability to:
1) use broadly based, job-related vocabulary in the context of work-based sentences, paragraphs, instructions, etc.,
2) identify details and action, locate relevant information, use charts, diagrams, and schematics . . . in context, and
3) synthesize written information from several sources, make inferences from text that does not explicitly provide what is needed.

In 1991, about one-third of U.S. workers used an eighth grade reading level to perform their jobs. Another third operated at the reading level comparable to a two-year college graduate. The final third used the reading skills of a four-year college graduate or higher.

*An example **initial competency standard** for entering Tech Prep: each student must demonstrate a ninth grade reading ability including a proficiency related to items 1 and 2 above.*

WRITING . . .

In the work setting, writing involves prewriting (topic selection, preparation, accessing, and organizing information), and writing (spelling, penmanship and/or keyboarding, reading, editing, and revising). Writing activities for Tech Prep are related to career activities.

While a recent survey reported only 8.4 percent of an average worker's time was spent on writing, the writing often came at critical junctures. Writing has large scale effects.

For Tech Prep careers, students need to:
1) experience activities that transfer information and convey meaning using key words, standardized sentences, place information correctly on forms, and
2) record transactions and events, identify the intent of the writing and understand the reading audience, outline sequences, and make descriptions clear and concise.

Surveys have determined that the average job uses writing in the following ways:
42% fill out prepared forms
25% record, summarize, and use language peculiar to specific occupations
23% writing memos and letters
10% writing academic style reports and articles

Tech Prep ties writing to the 90 percent of the writing done on jobs rather than the 10 percent usually assigned in typical classrooms. It is an error to assume that students capable of academic reports can instinctively write memos, business letters, record, summarize, use business language, and complete forms correctly.

*An example **initial competency standard** for entering Tech Prep: each student must be able to complete forms, record and summarize information, and use career related vocabulary at the ninth grade level.*

COMPUTATION . . .

A paradox exists. Nearly 75 percent of American workers are arithmetically literate, they can measure and compute. Nevertheless, by a similar amount, most Americans cannot apply what they know. Most math is taught as an end in itself. When asked, "What good is this?" the students usually hear that they will need it sometime, for the next class, or in college.

Some justification exist for the response, "It builds higher-order thinking skills." However, higher-order thinking skills can be taught in the context of authentic applications. For the vast majority of secondary students and postsecondary students, potential applications are the primary reason to pursue math skills. Tech Prep math skills are learned through applications.

For Tech Prep careers, students:
1) need to select and use mathematical operations to solve particular problems in work-related settings.
2) can use potential job situations to increase retention and the ability to apply skills.

Many workers use math at the eighth grade level. The expanding careers of the Tech Prep career paths need math skills at the postsecondary level or higher.

*An example **initial competency standard** for entering Tech Prep: each student must demonstrate an ability to organize information into quantitative formats, select appropriate computational tools, recognize errors, and perform ninth grade level math operations.*

LEARNING-TO-LEARN . . .

All persons entering the workforce will have to relearn and retrain with new skills during their lifetime. The new knowledge and skills will require individual initiative. Being capable of self-initiated learning is not just an advantage, it is a requirement. With knowing how to learn, a person can respond with the flexibility and speed needed to survive and prosper in a good career. Several keys are necessary to develop the self-learning skill.

For Tech Prep careers, students need to:
1) identify personal learning styles, capabilities, and sensory preferences,
2) use cognitive, psychomotor, and affective strategies and tools, and
3) match employment requirements and learning needs.

*An example **initial competency standard** for entering Tech Prep: each student must demonstrate learning styles knowledge by 1) employing methods which capitalize on strengths and compensate for weaknesses in specific situations; and 2) sorting activities into cognitive, psychomotor, or affective categories .*

OTHER ESSENTIALS

First and foremost is listening. Without a developed skill in listening, personal growth is blocked. Another is speaking. While these communications skills are almost universally accepted as essential, neither are generally required for prerequisite levels of technical skill preparation.

Also important are a range of other skills and characteristics. These include problem-solving; creative abilities; developmental skills such as self esteem, motivation, personal and professional goal setting and development; and interpersonal or group skills such as negotiation, teamwork, and leadership.

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REFERENCE

Carnevale, A. P., (1991), *America* and the New Economy, American Society for Training and Development. Washington.

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COOPERATIVE CURRICULA

A cooperative curriculum exists when curricula from both academic and vocational areas are combined and an integrated curricula is the result. Some schools call the cooperative curricula an infused curricula or integrated curricula.

CURRICULUM DEVELOPMENT

Cooperative curriculum development occurs when educators put aside turf issues regarding academic versus vocational education, buy into a single mission statement, and concentrate how best to serve students' needs. In cooperative curricula, neither the academic nor the vocational program areas have a greater role than the other. Student success is the number one priority in the school.

THE NEED FOR A COOPERATIVE CURRICULUM

There is a need for cooperatively developed curricula because students learn best when they can see the relevance of instruction. Therefore, it is in the best interest of both the academic and vocational teachers to work together to develop curricula that students will see as relevant to their future economic success.

Why infuse curricula from both academic and vocational areas? To make sure that what is taught has a relationship to what is needed today, tomorrow, and in the foreseeable future. Remember, students must comprehend this relationship. The universal question: "Why is this important to me?"

THE WIIFM PRINCIPLE

The WIIFM Principle is defined as, "What's In It For Me." Students learn information and skills best when it has significance to them. They tend to learn what they *think* will benefit them both now and in the future. Research has shown many, many times that students retain and use information they perceive as relevant.

FOUNDATION FOR SUCCESS

One of the tenets of education is that students deserve the opportunity for success. The common goal is to give each and every student, on more than one occassion, to learn, grow, and become successful. If tasks or competencies are taught in context, in a recognizable situation or framework, students see the connection between the material being taught and what they will need in the future

DEVELOPING A COOPERATIVE CURRICULUM

Administrators must take the *initial* lead in initiating, developing, and continually encouraging multidisciplinary teams. Once the multidisciplinary teams are organized, their degree of involvement depends on the need for support and feedback.

Multidisciplinary teams are teams composed of teachers from both academic and vocational programs, counselors, and administrators. The goal of the multidisciplinary team is to develop a

cooperative curriculum. Objectives of the multidisciplinary team are:

- To nurture a relationship between the academic and vocational teachers to such a degree that everyone strives for an open exchange of information.

- To assure that neither the academic nor the vocational course content is taught in isolation.

STEPS OF PROCEDURE FOR MULTIDISCIPLINARY TEAMS

1. Develop (locate, identify) a curriculum map which lists all of the academic objectives (tasks, competencies) to be taught by the disciplines involved.

2. Develop (locate, identify) a curriculum map which lists all of the vocational objectives (tasks, competencies) to be taught, by the occupational areas involved.

* NOTE: In Tech Prep, these objectives are developed *jointly* by secondary and post-secondary faculties and with *genuine* involvement by business.

3. Compare the curriculum maps to identify *when* the objectives are being taught.

4. Compare the curriculum maps to see *where* the objectives are being taught.

5. Develop a cross-matrix of these objectives that could be taught either by the academic or vocational teacher.

6. Identify objectives taught in a nearly concurrent time frame to facilitate collaboration between instructors.

CONSIDER: Can the timing of some objectives or activities be adjusted to make additional collaboration possible? An example might be when the math teacher teaches ratios and uses examples of developing balanced meals or calculating medications. The health teacher could *reinforce* the math teachers' lesson by teaching proscriptive diets and/or medications concurrently.

7. Develop a formal, integrated plan (curriculum) for use by both academic and vocational teachers.

8. Assure that the infused curricula is reviewed by all affected individuals and address their concerns (one way for the process to fail is not having all persons involved buy into the process).

A PROCESS BUILT INTO THE SYSTEM

As new technologies and business needs emerge (as determined by continual business involvement in joint secondary-postsecondary curriculum committees), review and revise as necessary. This is a continuing process.

INVOLVING EVERYONE!

Curriculum development becomes a cooperative effort when everyone involved with teaching (both academic and vocational disciplines) buys into the idea that the purpose is to provide instruction that will give *all* students an opportunity to succeed--not just those on the college track.

1. A cooperative curriculum cannot take place unless both academic and vocational teachers take an equal responsibility for developing instructional materials that will help students learn in context.

2. By learning in context, students begin to build strong foundations upon which they can base their continuing, life-long learning.

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ARTICULATION: CORE COURSES

A common core of courses is a concept promoted by the federal Tech Prep legislation and independent publications such as the SCANS reports, Goals 2000, America's Choice: High Skills or Low Wages, and others. Contained within these documents is a common thread pushing toward better preparation of all students.

THE TECH PREP CORE

From Title-III of the Carl D. Perkins Vocational and Applied Technology Education Act, Tech Prep shall include, "a common core of required proficiency in mathematics, science, communications, and technologies designed to lead to an associate degree or certificate in a specific career field; . . ." and requires curricula "appropriate to the needs" of the participants. In other words, do what needs to be done for students to obtain solid career preparation.

The Ford Foundation recently published a report stating, ". . . good basic skills and, increasingly, post high school education and training will be minimum requirements for hiring. The primary labor market is virtually shutting down for those with limited skills and attainment."

A SKILLS APPROACH

The "common core of required proficiency" relates specifically to the needs of a high-tech, high-wage worker. This is defined by current skills used on the job and new skills identified and targeted for the future. The basis for these skills is described in the recent reports from SCANS (see newsletter 2, E).

The career-cluster model, which is built on universal courses, is one that offers a great number of advantages for students. The Carl Perkins legislation specifies that students receive a core of mathematics, science, communications, and technologies. The precise language of the legislation encourages a structure of core courses supporting many career clusters.

CORE COURSES

A fundamental core is at the heart of career clusters which are formed around specific occupations. The cluster model offers an advantage. Core courses can support multiple program options and provide students with greater flexibility to shift from one program to another program if necessary or if desired.

Objectives for core courses come from math, science, communications, computer literacy, socioeconomics, government, history, and humanities. These basic objectives relate to jobs at all levels.

CORE INTEGRATION

In the academic and vocational integration concept, modules or elements of core content are directly linked to applications. This linkage between academic and vocational area is a sharing of content. However, it also requires routine collaboration among the various teachers. Integration relies on team teaching,

genuine cooperation, and cross-training of academic and vocational teachers to ensure sufficient mastery of the objectives by students.

Many times students are surprised when material from one class is used for activities in another class. Research has shown, however, that knowledge and skill retention is significantly enhanced when students engage in cross disciplinary activities.

CURRICULUM DESIGN

The career cluster approach to curriculum design is based upon the concept that there are clusters of occupations/jobs that require a common core of basic technical skills. The basic skill and technical core classes together can comprise a significant portion of a student's course sequence. Specialty courses are the only ones that are unique within a career option.

Career clusters provide the opportunity to involve significant numbers of students in common classes and build a strong base for several specialty areas. This base allows individuals the opportunity to adapt, advance, and change specialties as job opportunities arise or job requirements change.

ARTICULATION

Clusters, articulated through a Tech Prep core, can provide many options including traditional college-preparatory options. Some of the basic core material in the clusters can apply to individuals pursuing a baccalaureate degree directly from high school, as well as those who aspire to an associate degree or who plan to go directly to employment.

Core courses allow students with a variety of future plans to commingle. This is a positive feature of clustering.

GOALS

It is important for students to be aware of their personal goals. While students retain the ability to change their goals at various points in the secondary and postsecondary educational sequence, it is essential for a goal to exist at all times. Students cannot change a goal unless it first exists.

DEVELOPING THE CORE

Isolation can hurt any initiative. This is especially true with Tech Prep. Legislation specifies that curriculum development must be a collaborative effort between faculty members of secondary and postsecondary institutions. Integration between academic and vocational areas is also specified by the Perkins Act. Remember, business is a critical segment of the collaboration team. Tech Prep will be successful when the high-level skills essential for economic productivity are achieved.

PARTNERS IN *CORE* DEVELOPMENT

Development occurs through discussion. Partners in the discussion include:

- employers,
- teachers of academic and vocational subjects at secondary levels,
- teachers of academic and vocational subjects at postsecondary levels,
- counselors at secondary levels,
- counselors at postsecondary levels, and
- administrators.

RESULTS

Through a foundation built on core courses, employers can expect employees with:

- higher level thinking skills, and
- solid and far reaching abilities to apply knowledge.

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MIDDLE & ELEMENTARY PRE-PROGRAMS

If one word could be used to describe the Tech-Prep movement it is **integration**. Existing programs will be integrated to make a new and better whole. The many levels of education will be integrated to form a smooth and gap-free continuum of life-long learning. This is essential to sensitive and sensible educational reform.

NOW IS THE TIME

Like the birth of the age of technology, Tech Prep is a movement whose time has come. Reading, investigation, questioning and critical thinking will be necessary to stay in the field of education at any level. It is necessary for teachers and the curriculum to stay in focus with today's and tomorrow's needs.

FROM TURF TO TEAMWORK

Presently, the American education/work force spectacle is often one of separate entities engaged in energy-depleting turf wars, vying for the same learners and each lacking a clear understanding of the role of other players on the stage. No one wins, especially not the students. Families, the economy, and the community all suffer.

High schools blame elementary programs for poor background information, vo-tech schools blame high school for adequate preparation of only the college bound student, colleges blame everyone for the need to remediate what should be basic skills, and parents implicate the whole system when their children graduate and can't get a job.

CAREERS ARE FOR EVERYONE

We recognize that a problem exists but have done little to affect a workable solution that sends our "graduates" (even college graduates) out into the world of work with useable skills.

The development of *career related competencies* must be seen not as an add-on, but *an integrated part of every curriculum area* and *at every level* in the educational system. The over-all goal of education must become not in name only, but in reality, to prepare students of all interests and abilities to be productive citizens.

WORK *(it shouldn't be a 4 letter word)*

In a functioning democratic society the heart of citizenship is the work place. Workers must experience job satisfaction and security before home and schools can begin to run smoothly. Satisfaction depends on making wise choices based on interests, abilities, and values. Making choices becomes a skill that must be taught early and practiced a great deal from the beginning of a child's education.

K through COLLEGE

Career education objectives need to be logical and developmental, where students progress smoothly from pre-school through post-secondary with stopping-off points along the way. **Remember, guidance** is no longer the exclusive domain of the school counselor. **It is everyone's responsibility.**

Guidance helps students to see the relevance of what they are learning and to recognize that this knowledge can lead to a meaningful and rewarding future. Guidance counselors become the resource specialists to help teachers and individual students personalize learning.

CONNECTIONS TO THE HIGHER GRADES

At the high school level, the key word used for student planning is **skill-building**. Students develop the skills necessary to become life-long learners, informed job seekers, and productive citizens of the 21st century.

At the middle school level, the key word used for student planning is **exploration**. Students need to explore the application of knowledge being acquired in *every* class to answer the question utmost in their minds, "What good will this (math, science, parts of speech, historical dates, etc.) do me anyway?"

CRITERIA FOR SUCCESS

The success of programs at the two upper levels depends, as do so many things, on the successful teaching of firm, broadly-based rudiments at the elementary level. Career development competencies fall into three areas at all three levels of learning: *self-knowledge, educational and occupational exploration, and career planning.*

For the elementary school student, *self-knowledge* is an awareness of the importance of self-concept in life, the beginnings of a healthy self-concept built on clear knowledge of successes and strengths. Another component for elementary and middle levels is personal interaction skills. These skills will eventually lead to employment and the formation of healthful personal ties. Further, the individual pace of personal growth and change has it's beginning here also.

EXPLORATION IS EDUCATION

Educational and Occupational Exploration includes an awareness of the benefits of the educational achievements in today's society.

A change is required
from
all successful roads lead to a baccalaureate degree
to
all work has dignity and rewards.

Along with this attitudinal shift comes an appreciation of the relationship between work and learning. Developing an understanding of the importance of personal responsibility and good work habits will prove invaluable in drug and alcohol education programs as well as increasing achievement in school. The pattern of lack-luster learning common to the student now labeled "at-risk" is lessened as students learn for themselves instead of just trying to please adults. *All* students deserve to know, "Why is this important?"

CAREER PLANNING

At the elementary level, career planning centers on making solid and defensible decisions which is a life skill useful in all phases of development. Each person plays many interrelated roles in life, but most people do not perceive this. Modern views of work include recognizing the problem of sexual stereotyping and becomes the task of matching jobs with individual interests, abilities, and values.

This begins in the elementary school and must continue through the middle school to the high school and into postsecondary education. Finally, students at all levels need to realize that career planning for them may take many directions as they gain self and world knowledge. **Changing a plan is okay, but have a plan!**

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INTEGRATION OF ACADEMICS

The integration of academic and vocational education has become recognized as a major reform movement. Requirements from the Carl D. Perkins Vocational and Applied Technology Act of 1990 have reinforced this trend. Several publications from NCRVE (see resource section) detail concepts and models.

STEPS TO INTEGRATION

Faculty Cooperation

1) First, teachers must learn about each other. This will then enable them to offer help and ask for help.
2) Next, teachers begin instructing one another. Generally focusing on basic skills taught in their own field, this eventually evolves into curriculum planning and sharing information about instruction and students.
3) Finally teachers begin assisting one another with actual instruction, coordinating activities, assignments, and schedules. The approach to specific skills is carefully coordinated to eliminate contradictory information.

Curriculum Development

1) The initial efforts involve extensive periods of time for teachers to work together planning coordinated assignments, projects, and sequences of instruction. Curriculum alignment is important here.
2) Next, focus on the current and future needs for the curriculum. Decide what will change and what will not change. For this, a strong sense-of-mission and good business connections are necessary.
3) The advanced state places curricular activities in the scope of extensive projects that include all aspects of student instruction and cause student interaction within the business community.

Instructional Strategies

1) In the day-to-day routines, teachers look for opportunities to integrate and cooperate.
2) From successes in routine functions, teachers begin joint assignments, team teaching, joint grading of assignments, and/or combined teaching strategies.
3) The next step brings in community and business based individuals to enhance the integration and curriculum development.

Administrative Practices and Procedures

1) The first step is identify ways to facilitate the process for teachers and students. Locate obvious and subtle barriers that can be removed. Provide support for teachers taking risks. Tell them failure is okay if the experience leads to eventual success.
2) Next, administrators help the teachers identify and work with the constraints that cannot be removed. This requires constant effort to maintain open communications.
3) Finally, critical to the success is empowerment for teachers; a feeling that they were involved and responsible for the integration process.

COMMUNITY COLLEGE MODELS

These approaches differ in their methods, content, conception of integration, and ambitions. Some are small modifications, while others restructure community colleges in novel ways. Some continue to stress academic content to contextualize such learning, while others are true hybrids.

General education requirements are the most frequent form of integration for students. Typically, general education courses are not modified to suit the specific interests of students.

Applied academic courses are another common approach to integration with applications in occupational areas, like technical writing or business math. When these courses are taught to vocational students only, they reinforce the segregation that integration of academics is trying to dissolve.

Cross-curricular efforts are fairly wide spread. The best-known is "writing across the curriculum," in which

instructors are encouraged to incorporate more writing into their courses--either as a way of teaching writing or as a way of reinforcing other learning. Similar efforts: communications across the curriculum, humanities across the technologies, and a reading across the curriculum program.

Incorporating academic modules is a method used by some instructors. It is based on academic disciplines--history or ethics, for example--and is used to broaden the perspectives of students.

Multidisciplinary courses take the perspectives of academic disciplines and incorporate broad job oriented issues. For example, some explore literature (fiction or non-fiction) to explore themes about the role of work for individuals and society; several examine the history and effects of technology; still others investigate the ethical issues surrounding work and technical change.

Tandem and cluster courses are where two or more complementary courses may be developed for simultaneous enrollment by students. This allows instructors to reinforce material from each other, to present similar issues from unique perspectives, and develop joint projects. Students and teachers develop stronger personal relationships which facilitate collaborative learning and teaching.

Colleges-within-colleges are a way of organizing students to take all their courses together. Similar to tandem and clusters, this method is less flexible because students must be committed to taking all program courses in this fashion.

Remediation & English as Second Language courses have been developed with a career orientation. In theory, such approaches can provide greater motivation.

SECONDARY MODELS

Incorporation involves placing more academic content into vocational courses and is the simplest form of integration. No institutional changes are made. This can be developed on a course-by-course or teacher-by-teacher basis.

Combining vocational and academic teachers into teams can enhance integration. This requires collaboration and will modify the curriculum.

Adding vocational content to academic courses also causes curriculum modifications. These courses are generally referred to as *applied academics* and are becoming a very popular method of integration.

Alignment modifies both vocational and academic courses. Cooperation is necessary because the courses are coordinated across the disciplines over a period of time. This may affect as few as two teachers, an entire school, or several schools at multiple levels.

Projects can be incorporated one class at a time or an entire school. This model allows students to replace elective credit with structured projects that integrate knowledge and skills from both vocational and academic courses. Projects may include research papers, oral presentations, or other structures.

Academy or school within a school requires institutional change with teachers from both vocational and academic areas. This model allows vertical and horizontal integration with a group of students over a period of years.

Magnet schools demand the creation of self-contained occupational themes. Faculty at these schools offer vocational education with a focus on the integration of all subjects.

Clusters or career paths require a coherent sequence of courses for students to follow. Traditionally vocational and academic department are broken down and replaced with career clusters. Collaboration is required by all teachers to achieve both vertical and horizontal integration.

RESOURCES

NCRVE has several publications related to *Integration of Academics.* These publications may be obtained by calling 800/637-7652.

MDS-118, Proceedings for Forum on Integrating Occupations and Academic Education.

MDS-438, Two Worlds: Vocational and Academic Teachers in Comprehensive High Schools.

MDS-141, "The Cunning Hand, The Cultured Mind": Models for Integrating Vocational and Academic Eduction.

MDS-057, General Education: Vocational and Academic Collaboration.

MDS-251, A Time to Every Purpose: Integrating Occupational and Academic Education in Community Colleges and Technical Institutes.

MDS-275, Teachers' Roles in the Integration of Vocational and Academic Education.

MDS-276, Helping Teachers to Understand Their Roles in Integrating Vocational and Academic Education: A Practitioner's Guide.

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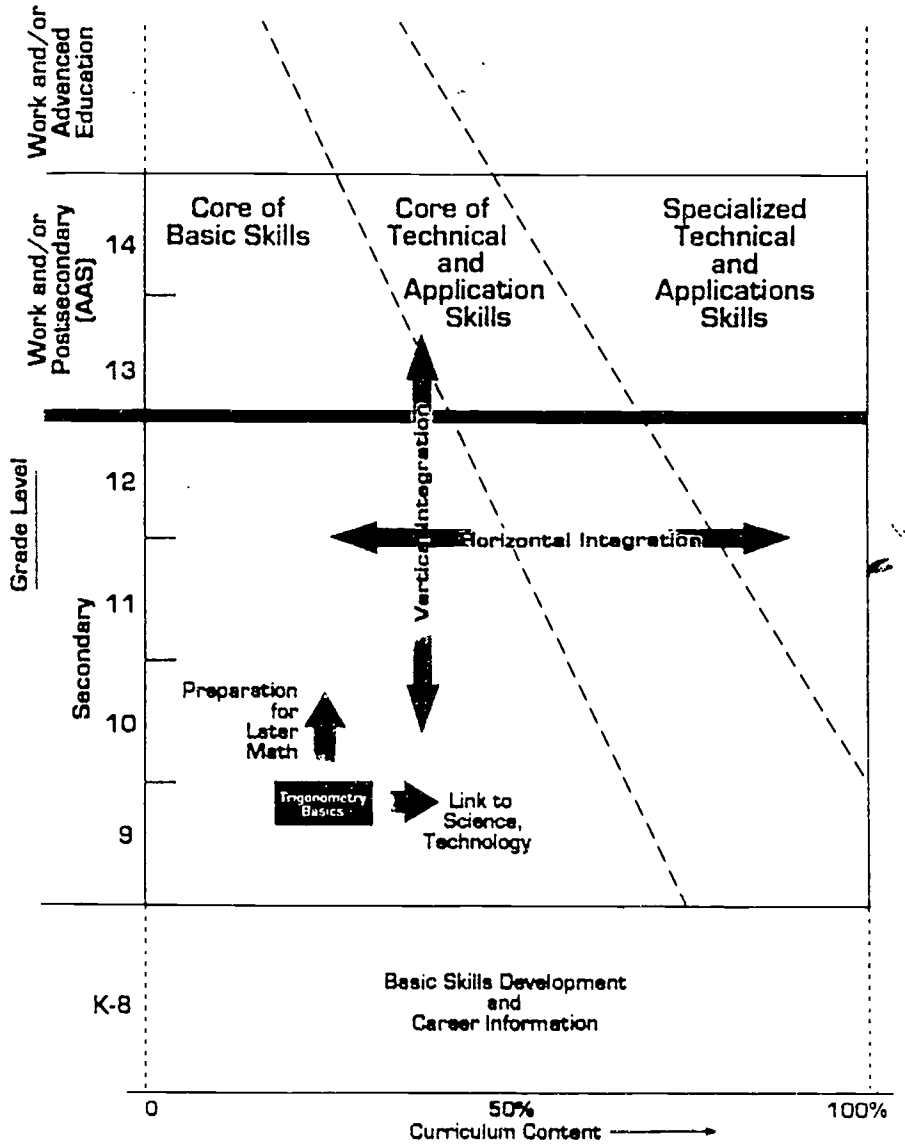
Curriculum Development
Integration Versus Articulation

Dr. Walt Edling

As Tech Prep programs continue to develop, the notion of what constitutes a Tech Prep curriculum is gaining better definition. What began as efforts to articulate secondary and postsecondary programs in vocational and technical areas is now leading to significant changes in curriculum design.

Early articulation efforts focused on the interface between secondary and postsecondary curriculum and produced advanced placement or dual credit arrangements in areas of overlap with no significant changes in curriculum at either level. Under the joint development concept inherent in Tech Prep (including the mandates in the Perkins legislation) the opportunity exists for true curriculum integration with significant changes in both secondary and postsecondary curricula. Two dimensions are involved in integration, vertical and horizontal, and both are fundamentally important to the success of Tech Prep programs.

Integration in Tech Prep Curricula



The relationship between these dimensions and curriculum elements is shown in the diagram which displays the three broad elements of Tech Prep curriculum—basic skills, technical core, and technical specialty. In this model of curriculum, all three areas exist throughout grades 9-14 but in varying proportions. In fact, all three areas extend upward to baccalaureate and graduate education and downward to elementary grades. The implications for K-8 are already recognized in some Tech Prep programs.

In this model students are given strong preparation in basic skills in the elementary and secondary programs; however career information is also introduced in grades K-8, and as the educational level of the student progresses, the focus shifts toward technical and specific occupational skills. Basic skills development continues, but in decreasing proportions.

In each of these areas, there exists a logical sequence or hierarchy of skills, but secondary and postsecondary curriculum designs have developed in isolation, and as a result, two weaknesses have appeared. These weaknesses are addressed in the Tech Prep concept.

One weakness has been the lack of horizontal integration among the three major areas. Basic skills courses have been taught with little or no reference to context and application, and technically oriented courses have failed to utilize and reinforce an adequate level of basic skills. As an example, trigonometry is usually delayed to grades 11 or 12 (if included at all); while basic science or technical courses could readily utilize basic trigonometry by the tenth grade. The applied academics are one example of systematic horizontal integration.

The other weakness of existing curriculum design is at the interface between secondary and postsecondary programs. Little or no integration occurs between high schools and two-year colleges, and as a result there is overlap, duplication, or lack of needed coverage in basic skills areas as well as technical core or specialty areas. Articulation efforts are only a band-aid approach to this weakness, which needs to be addressed through more vertical integration.

Horizontal and vertical integration need to be correlated. That is to say, the hierarchy of skills in communications, math, science or social science needs not only to be arranged in logical progression vertically but also should link horizontally to needs across the curriculum. Needless to say, this dual process of integration is more complex than traditional approaches and requires joint participation of secondary and postsecondary faculty drawn simultaneously from many disciplines. This model also points strongly to significant curriculum changes at both the secondary and postsecondary levels.

The benefits justify the extra effort. Providing students with career and application content for their studies increases the sense of relevance and context that is critically important in maintaining student interest. Success in learning is greatly enhanced since the majority of learners respond well to contextual strategies. Basic skills can be introduced when needed for other areas of study, and this cross-referencing produces strong reinforcement of learning. In current practice, students are often confronted with a jumble of seemingly unrelated facts and information.

Joint planning exposes duplication or inconsistencies in curriculum structure especially in the transition from secondary to postsecondary. It calls attention to the need to extend contextual and applied learning strategies into college programs. As students experience the benefits of improved methodologies at the secondary level, they will increasingly demand similar techniques at the postsecondary level.

The need to establish a strong base of basic skills to support the increasing demands in technical specialties tends to reduce the amount of specialty at the secondary level. As a consequence, vocational programs are becoming more cluster-oriented and the number of highly specific competencies achieved is reduced.

Curriculum development encompassing Tech Prep concepts can be confusing and unfamiliar. The model of horizontal and vertical integration can help to establish a framework within which to organize this formidable task.

For additional information contact Dr. Walt Edling at CORD, P.O. Box 21689, Waco, TX 76702-1689, 800/972-2766.

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ALL ASPECTS OF THE INDUSTRY

[Editor's note: "all aspects of the industry" is a phrase used in the basic grant (Title II) section of Carl Perkins Act. While the Tech Prep section (Title III) of the law does not duplicate use of this phrase, Title III does specify 2+2 curricula that leads to successful employment through technical preparation. Therefore, this information is applicable and significant to Tech Prep. The following is excerpted from Newsnotes, Center for Law and Education, Cambridge.]

WHAT

Providing students with "strong experience in and understanding of all aspects of the industry" they are preparing to enter is central to the Perkins Act's new state and local planning requirements. Under the Act, "all aspects of the industry" includes:

Planning (e.g., at the industry level and at the firm level; various forms of ownership, including cooperatives and worker ownership; relationship of the industry to economic, political, and social context).

Management (e.g., methods typically used to manage enterprises over time; methods for expanding and diversifying workers' tasks and broadening worker involvement in decisions).

Finance (e.g., ongoing accounting and financial decisions; different methods for raising capital to start or expand enterprises).

Technical And Production Skills (e.g., specific production techniques; alternative methods for organizing the production work, including methods which diversify and rotate workers' jobs).

Underlying Principles of Technology (e.g., integrated study across the curriculum of the mathematical, scientific, social, and economic principles that underlie the technology).

Labor (e.g., worker rights and responsibilities; labor unions and labor history; methods for expanding workers' roles).

Community Issues (e.g., the impact of the enterprise and the industry on the community, and the community's impact on and involvement with the enterprise).

Health, Safety, And Environmental Issues (e.g., in relation to both the workers and the larger community).

WHY

The traditional industrial models of vocational education seek to ask employers specific questions about exactly what jobs will be available in the future. Then questions are addressed about what specific skills will be needed for an employee to do each one. Next, certain students are identified or recruited and trained to fit these jobs. *Whether or not that model once worked, it not longer does.* As an alternative model, providing students with understanding and experience in all aspects of their chosen industry is essential to confront the need for:

Academic and Problem-Solving Skills

If vocational skills are limited to a narrowly defined job task, efforts to integrate academic and vocational education are likely to fail. Teachers and students see that the academic skills needed to accomplish that task are at best minimal and diluted, perpetuating the split between academic and vocational. In contrast, confronting all aspects of the problems facing an industry and the enterprises within it gives teachers and students a rich platform for analysis problem-solving, and utilizing skills in reading, writing, mathematics, science, and social studies.

Career Development and Employability

If programs provide only the skills for one job, young teenagers are forced into career choices which are unrealistic, unfair, and leave them prepared for little else. Because both individual choices and labor markets change frequently, only a few people work in the fields for which they were originally trained. In contrast, students learning all aspects of an industry can explore a particular field in depth while gaining transferable skills, such as planning and management, which expand their later opportunities to do other things.

Technological Change

If programs tailor their training to today's skill requirements, even the students who stay in the field are left behind by rapid technological change within their jobs. Schools cannot predict these constant changes in job definitions, let along afford to revamp their training equipment every year to keep up. In contrast, students with broad skills in all aspects of an industry can understand and actively participate in change.

Economic Development

If programs prepare students only to fill the current job openings in low-income communities, they are left passively dependent upon too few jobs, which demand too few skills and provide too little income for a decent life. In contrast, students who understand and have experience with planning, management, labor and community issues, etc., can survive, thrive, and help others in low-income communities. They can help develop institutions which address unmet social and economic needs through better use of people's underutilized potential.

HOW

There are many ways to incorporate all aspects of the industry while integrating strong academic preparation.

In Every Program

Agriculture programs have always taught "all aspects" of running agri-businesses; students learn not just about crops and implements, but how to manage and finance, as well as soil chemistry, animal husbandry, etc. This approach can be expanded to programs in all areas.

In Academies

"Academies" which are often school-within-a-school programs focusing on a particular industry, can be designed to involve students in all aspects of that industry. They involve teachers from a variety of disciplines in planning a carefully sequenced combination of course work and skills training. Some academies have strong links with firms in their area (e.g., electronics, health, financial services), which provide mentors, guest lecturers, tours, and even summer internships for some students or teachers.

In Cooperative Placements

Cooperative placements with existing employers can also be restructured so that the student's work experience really fosters a critical understanding of all aspects of the industry and contributes to deeper academic skills.

WHICH DEFINITION

Finally, whose version of "all aspects of the industry" will be built into the curriculum must be addressed. For example, to allow just education, or just corporations, or any one segment to define the meaning of "planning," "labor," "environment," etc. would not serve the public interests or students' needs for critical thinking skills. Schools should draw upon a full range of sources in and outside the school to develop each of these aspects. Thus, there is a link between the Act's requirements on all aspects of the industry and those on participatory planning by teachers, parents, students, and area residents.

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APPRENTICESHIP

School to work transition programs are an effort to upgrade the academic and job skills of students who plan to enter the workforce after school . . . high school, college, any school. Apprenticeship is one of the many methods available, however it will take on a profound significance.

AVENUES FOR APPRENTICESHIP

Education Week (June 5, 1991) listed several primary efforts associated with apprenticeship. These include:

Registered Apprenticeship. The traditional apprenticeship sponsored through organized labor and currently enrolls relatively few US high school graduates. Of the 300,000 apprenticeship programs registered, most are in the construction and metal-working trades. Federal and state governments regulate the system through the National Apprenticeship ("Fitzgerald") Act of 1937.

Cooperative Education. These programs are usually school-led efforts that involve local employers giving students a taste of specific jobs. They are built around the idea of internships.

School-Based Enterprise. Students work at school to produce a product in such enterprises as school restaurants, child-care centers, construction jobs, and auto-repair shops. Many of these programs are established to teach entrepreneurship, give students an early grasp of business operation, and reinforce classroom learning.

School-Business Partnerships. While relatively new to academic classrooms, partnerships have long been a mainstay of vocational programs. In addition to contributions such as supplying materials, funding, and volunteers to classroom programs, many employers involved in partnership programs follow-up by employing students in summer jobs or part-time work.

WORK-BASED LEARNING

Activities and funding reflect a surge of interest by policymakers, business groups, and academic experts. Apprenticeship efforts now taking shape in a number of states and communities intend to fill voids existing in current education and employment programs.

These activities tend to follow the traditional American apprenticeship model or the widely acclaimed German system, which involves businesses in the educational process while students are still in secondary school. Either way, apprenticeship supports the *"forgotten half"* of the student population now in our schools and soon to be the majority of our workforce.

AN APPRENTICESHIP MODEL

An apprenticeship program should:

- Prepare students to enter a high skill--high wage, broadly defined occupational area.
- Take young people at the end of the 10th grade through a four-year process connecting high school and the first two years of postsecondary learning.

- Include classroom instruction and paid workplace experience and learning.
- Provide both academic and occupational credentials, including a high school diploma; up to two years of college credits towards an Associate's degree transferable to a four-year institution; and certification of technical competencies in the student's chosen field.
- Ensure that workplace learning enhances and builds on classroom learning.

Youth apprenticeship should also:

- Provide sequenced, integrated, and complementary courses across secondary and postsecondary levels.
- Include academic course work required for higher education.
- Require competence in applying academic skills in work-related situations.
- Develop transferable skills in using modern technologies such as computers and computerized equipment.
- Include workplace readiness skills.
- Offer instruction and experiences in *all aspects of the industry* the students plan to enter. This includes planning, management, principles of technology and production skills, labor issues, health, and safety.

Apprenticeships at the school need:

- Incorporation of the best lessons from experimentation in cooperative learning, team teaching, and applied learning. Classroom learning and teaching need to be team-based, interactive, and relevant.
- Teachers across disciplines to work together as a team to plan curriculum, coordinate lesson plans and projects, and identify special needs of students.
- Students to have experiences showing the link between what they learn at work and at school. Teachers need to interact with workplace supervisors to find ways of enhancing classroom activities.

Apprenticeships at the work site need:

- Employers to offer young people an attractive and credible career opportunity--a career path within the firm, occupation, or industry.
- Investment in considerable training, coaching, or mentoring.
- Paid positions for the apprenticeship positions.
- Employers to interact with teachers on a routine, ongoing basis to discuss progress, needs, and opportunities.
- Supervisors who have received the necessary training to perform the apprenticeship support roles.
- Curricula designed to include the fundamental competencies that need to be mastered and applied at work.

BENEFITS
(from the National Alliance of Business)

For students:

- quality academic preparation
- income while learning
- work experience
- access to good jobs
- enhanced contacts for employment options
- self-confidence through success at work
- personal attention

For employers:

- an expanded pool of qualified applicants
- better recruiting and screening
- a quick and reliable source of skilled workers
- increased ability to meet contractual and legal obligations for affirmative action and equal employment
- improved community relations
- increased new-employee retention
- direct influence over tax-supported curricula

For schools:

- reduced dropout rates
- increased student motivation
- experiential learning based on solid research
- higher outcome standards
- better service/productivity for the community
- enhanced public reputation
- improved placement/productivity of graduates
- expanded resource base

For communities:

- increased employability of the student majority
- better citizens, workers, and taxpayers
- decreased public assistance
- enhanced community prestige and business climate

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N • E • W • S • L • E • T • T • E • R 6, A

EXAMPLES & PROJECTS IN MISSOURI

Missouri is establishing a network of Tech Prep consortia primarily between secondary schools (comprehensive high schools and area vocational technical schools) and community colleges. Each consortium provides for fiscal support of development and implementation activities including in-service for instructors, administrators, counselors, and other personnel.

These consortia are supported through the Perkins Act of 1990 and suggest 2 + 2 type models to be explored. Evaluation is centered on academic and job skills development. Utilization of applied courses is encouraged and student retention is a goal. Objectives include effective employment placement, transfer to four-year programs, dropout prevention, and business involvement.

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COORDINATOR, DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Dr. Robert Robison, Coordinator
P O Box 480
Jefferson City, MO 65102-0480
314/751-3500

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NORTHWEST MISSOURI TECH PREP CONSORTIUM

This project is coordinated by the Metropolitan Community College District which includes Penn Valley, Longview, and Maple Woods. It sponsors 16 secondary school districts in Northwest Missouri. The consortium is mainly located north of Nevada AVTS to the Iowa line; east to Clinton and northwest to a connecting point around Maryville.

Activities have included in-service, train the trainer, curriculum development, promotion, course offerings, and consortium planning. Curriculum areas include Health Care, Business, and Technical Education.

Contact Jim Everett, 3200 Broadway, Kansas City, MO 64111, 816/759-1167.

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HEART OF MISSOURI TECHNICAL EDUCATION CONSORTIUM

State Fair Community College hosts this consortium concentrating on Business and Health first with 13 secondary districts involved in the consortium. Applied mathematics has been implemented in most of the cooperating schools. HOMTEC is involved in curriculum development in agriculture, business, health occupations and trade and industry.

Contact Clark Harris, State Fair Community College, 3201 W. 16th Sedalia, MO 65301, 816/530-5800

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NORTH MISSOURI TECH PREP CONSORTIUM

Located at North Central Missouri College in Trenton, this consortium has articulated agriculture, electronics and office occupations/data handling programs. Faculty members from North Central and Maple Woods have participated with secondary instructors in this effort. Many workshops have prepared teachers for the new applied curricula.

The contact persons are Bill and Carol Gutshall, North Central Missouri College, 1301 Main St, Trenton, MO 64683, 816/359-3948.

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SOUTHEAST MISSOURI REGION TECH PREP EDUCATION CONSORTIUM

This consortium, working from the campus of Mineral Area College, has designed seven-day workshops for context-based education. Twenty-five high schools and four AVTS's are served. Health, technical, business, and public service career paths are a part of the curriculum development. Five 2+2 plans are ready for the 93-94 school year.

Contact Ray Walsh, Mineral Area College, Flat River, MO 63601, 314/431-4593.

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MID MISSOURI TECH PREP CONSORTIUM

Centered at Linn Technical College, this consortium works with nearly 20 districts near Missouri's capital. Workshops and other meetings are involving employers and other community representatives, educators, and students.

Contact J. Rick Mihalevich, Linn Technical College, One Technology Drive, Linn, MO 65051, 314/897-3603.

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EAST CENTRAL MISSOURI TECH PREP CONSORTIUM

East Central College hosted a widely attended summer institute to begin work on Tech Prep. Experts from Maryland to Oregon led discussions and activities. Initially health and manufacturing clusters are being developed.

Contact Debbie Jeager, East Central College, Hwy. 50 at Prairie Dell Rd, Union, MO 63084 (314) 583-5195 x 2409.

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MID RIVERS TECH PREP CONSORTIUM

Pathways in health/human services, business and communications, electronics, and trade/technical programs is the emphasis of this consortium. It includes public and parochial schools, the St. Charles County Community College, and four apprenticeship programs.

Contact Bob Kirkpatrick, Coordinator, Pike/Lincoln Tech Center, Rt. 1, Box 38, Eolia, MO 63344, 314/485-2900.

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ST. LOUIS AREA TECH PREP CONSORTIUM

This consortium includes the three campusus of the St. Louis Community College District and three school districts. Curriculum teams are working on child care, administrative office systems, fashion merchandising, information systems, and commercial art/graphic communications.

Contact Marcia, Pfeiffer, Coordinator, St. Louis Community College at Forrest Park, 5600 Oakland Ave., St. Louis, MO 63110, 314/644-9942.

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BOOT HEEL TECH PREP CONSORTIUM

The Three Rivers Community College and six AVTS's are beginning the consortium. A committee involving educators, business and industry, and community members are working to develop Tech Prep by responding to the needs of the region.

Contact Sue Waggoner-Flowers, Coordinator, Three Rivers Community College, 2080 Three Rivers Blvd, Poplar Bluff, MO 63901, 314/840-9688.

= = OTHER PROJECTS INCLUDE = =

NORTHEAST MISSOURI CURRICULUM CONSORTIUM
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N • E • W • S • L • E • T • T • E • R 6, B

EXAMPLES & PROJECTS: NATIONAL

The U.S. Department of Education has awarded nine grants to Tech Prep Model demonstration sites. All were operational by January, 1993.

WHY NATIONAL DEMONSTRATION PROJECTS?

The intent is to develop and disseminate materials, information, systems, and procedures that will assist statewide/local agencies and schools to design, implement, and evaluate Tech Prep programs.

Three major areas of concentration are specified:

1. Improvement of teacher training and training for other instructional personnel (including counselors and administrators who are needed to carry out Tech Prep programs).

2. Provision of resources, material, technical assistance, in-service training, and other forms of professional development to help others replicate successful Tech Prep education.

3. Independent evaluations of selected Tech Prep consortia projects based on student achievement, completion, placement rates, and other criteria.

LOS ANGELES AREA TECH PREP

Trade and industrial and business education at the secondary and postsecondary levels are emphasized in this demonstration grant. A two-year controlled study compares the achievements of students who have participated in tech prep programs with those who have not--based on job placement success, movement up the career ladder, secondary retention and transfer to postsecondary programs.

Contact: Laurel Adler, East San Gabriel Valley, Regional Occupational Program, 1024 West Workman Avenue, West Covina, CA 91790, 818/960-3025.

TECH PREP INTEGRATION MODEL

The Rhode Island Community College and twenty-seven secondary schools are developing and testing a standardized Tech Prep evaluation model. The evaluation design wil consist of both a quantitative (longitudinal) and a qualitative analysis.

Contact: Judith Marmaris, Coordinator, Community College of Rhode Island, 400 East Avenue, Warwick, RI 02886, 401/825-2143

CORD TO EVALUATE SEVEN TECH PREP PROJECTS

The Center for Occupational Research and Development (CORD) project provides for an independent evaluation of model Tech Prep Consortia programs located at (1) Norfolk, VA, (2) Savansea, SC, (3) Austin, TX, (4) Roanoke, VA, (5) Oakland County, MI, (6) Las Vegas, NM, and (7) Portland, OR. A nationally recognized specialist will conduct the evaluations.

Contact: Maurice Dutton, CORD, P.O. Box 21689, Waco, TX 76702, 817/772-8756

INFUSION/INTEGRATION PROJECT

The Mt. Hood Regional Cooperative Consortium Tech Prep project concentrates on curriculum infusion and integration of academics. The demonstration grant provides for the dissemination of information and materials describing successful applications. A "National Reaction Panel" of experts in Tech Prep and educational integration will present the findings via national teleconference and/or video tapes.

Contact: Jack Miller, Mt. Hood Community College, 26000 W.E. Stark Street, Gresham, OR 97030, 503/667-7313

THE RICHMOND COUNTY TECH PREP MODEL

The Richmond County Project (see newsletter 6-C) started Tech Prep long before it was fashionable or federal funding was available. It is considered a premier site for exemplary Tech Prep.

Almost one-half million dollars is provided by the demonstration grant to disseminate information about the Richmond Tech Prep model. Objectives include (1) providing information to at least 3000 new persons outside North Carolina, (2) establishing at least twenty new consortia based on the Richmond model, (3) providing technical assistance to prospective and previous model adopters and (4) conducting a third-party evaluation of the model and demonstration activities.

Contact: Myrtle D. Stogner, Director, North Carolina Tech Pep Leadership Development Center, Richmond County Schools, P.O. Drawer 1259, 522 Hamlet Avenue, Hamlet, North Carolina, 28345, 919/582-7187

CONSORTIUM TO RESTRUCTURE EDUCATION

Coordinated by the Frances Tuttle Vo-Tech Center in Oklahoma City, the "Consortium to Restructure Education through Academic and Technological Excellence's" uses demonstration grant dollars to assess achievement of consortium objectives. They will also disseminate the results about the programs and assist others in replicating the model program.

This project will develop a system for collecting data about students and their successes at both secondary and postsecondary levels. Students will be followed through the various educational levels and into employment. Product outcomes include realigned applied mathematics curriculum with supplementary exercises and counselors handbook.

Contact: Carla High, Frances Tuttle Vo-Tech Center, 12777 North Rockwell, Oklahoma City, Ok, 73142, 405/722-7799 x380

THE PACE MODEL

The Partnership for Academic and Career Education Tech Prep project is administered by the Tri-County Technical College at Pendleton, South Carolina. The objective is to assist increased curricular integration at the classroom and program levels, as well as among high schools, community colleges, and baccalaureate degree institutions. the concepts of integrative learning, multiple intelligences, and learning styles are incorporated in this classroom-based approach. Technical assistance, on-site workshops, and practitioner-based assistance through telephone consultations and conference calls are included.

Contact: Diana Walter, Tri-County Technical College, P.O. Box 587, Pendleton, South Carolina, 29670, 803/646-8361 x2356.

SEATTLE TPAD PROGRAM

The Seattle Public Schools will "refine" and "package" major components of the Tech Prep Associate Degree Program. Systemic intervention for school reform and restructuring are included through the integration of academic and vocational instruction. The Northwest Regional Educational Laboratory and Seattle School District will design and implement formative and summative evaluations of the project. Materials and electronic media will be shared.

Contact: Gerald Butts, Seattle Public Schools, 815 4th Avenue, North Settle, WA, 98109, 206/281-6862

SOUTHERN MARYLAND EDUCATIONAL CONSORTIUM

The Southern Maryland Tech Prep project, operated by the SME Consortium, includes St. Mary's County Public Schools, Calvert County Public Schools, and the Charles County Community College (see newsletter 6-C). The grant provides for extensive independent evaluation, demonstration activities in the form of on-site visits, technical assistance, train-the-trainer workshops on curriculum development, and a summer training institute for teachers.

Contact: Mary Byrski, Charles County Community College, P.O. Box 910, Mitchell Road, LaPlata, MD, 220646, 301/934-2251 x443.

Additional information and specifics about any of the demonstration projects may be obtained by contacting: Richard DiCola, AVAE/DNP/PIE, U.S. Dept. of Education, Switzer Building, Room 4512, 400 Maryland Avenue, S.W., Washington, D.C., 20202, 202/205-9962.

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N • E • W • S • L • E • T • T • E • R 6, C

WHERE IT IS WORKING

Some schools have been developing Tech Prep prototype curricula for several years. These schools are continually asked, "How is it working?" Some schools have statistics, others have testimonials, still others are conducting longitudinal studies. In the final analysis, Tech Prep will work, or not work, depending on the actions of the people involved.

NORTH CAROLINA

One of the sites starting Tech Prep activities before federal funding was available is Richmond, North Carolina. The project has been going on long enough for high school graduates to have completed all four years of secondary education in a Tech Prep curriculum and continue on with the "plus 2".

Evaluation . . .

Richmond County evaluated their program based on SAT scores, retention (drop-out rates), and graduation follow-up. Following Tech Prep implementation, SAT scores increased 47 points in Richmond County compared to a three point increase for the entire state. Retention has increased in these schools from 92.8 percent to 97.0 percent (a drop-out reduction from 7.2 percent to 3.0 percent). Students enrolling in two-year colleges rose 17 percent, and enrollments in four year institutions rose 10 percent.

Subject by subject . . .

Competence in individual subject areas also benefitted. Thirty-one percent of the graduating class in 1989 took chemistry; their average raw score on an end-of-year test was 34.3. Three years later, 43.5 percent of the graduating class had taken chemistry and the average raw score increased slightly to 34.9. Similar results occurred in Algebra I and II.

North Carolina requires all high school graduates to complete an algebra course to receive a high school diploma. It is significant when core subjects such as algebra, biology, or chemistry have meaningful increases in the number of students enrolled and test scores are stable or improve. This provides strong evidence of the rigor and value of "applied curricula".

MARYLAND

Missourians have travelled to several sites in Maryland to observe programs in place. Also, leaders from Maryland have come to Missouri sharing their experiences. St. Charles County and Calvert County have a track record with their project where students take a common core of traditional and applied academics through various career paths.

Results . . .

Eighty-seven percent of the 1992 Tech Prep graduates chose to continue their education and/or had jobs. This is a large increase compared to students graduating prior to Tech Prep. Counselors attribute this increase to the elimination of "general-education" courses and close working relationships with business.

Clusters . . .

Tech Prep in this consortium has several clusters including business, health and human services, and engineering. These clusters work through eleven programs and articulate with business education, medical assisting, electronics, computer-aided drafting, and other areas. Further, non-traditional apprenticeships are being developed in areas such as child care.

OREGON

The state of Oregon has developed criteria for certificates of initial mastery (CIM) and certificates of advanced mastery (CAM) responding to some of the national studies on educational reform. Several local projects have been successful. One has received the U.S. Department of Education's Exemplary Tech Prep Program award.

The Portland Community College and the Portland Area Vocational-Technical Education Consortium developed a two-phase implementation plan. Phase one involved articulation. Phase two developed integration.

Articulation . . .

Articulation agreements were developed between the Portland Community College district and 26 high schools. These agreements, which vary from school to school, have provided career paths for nearly 50 separate associate degree programs. Over half of these agreements are directly transferrable to baccalaureate degree programs. Further, dual credit is available to high school students in many areas.

Integration . . .

Articulation is just an initial step. Integration is the real sustenance of Tech Prep. By combining the secondary and postsecondary levels, Portland held staff training and curriculum development workshops in the areas of math, science, and communications. High school and college instructors worked together to complete the training.

Assessment . . .

Methods of assessment include the Oregon statewide assessment examinations. This is now being expanded to include portfolios. By 1995 every high school in Oregon must have a defined school-to-work program in place. The Portland area Tech Prep initiatives have become a model for these efforts.

MICHIGAN

Beginning in 1991, a coalition of mostly rural areas identified Tech Prep as the vehicle for developing stronger technical programs, work force literacy, career guidance, and job placement services. The effort continues with 20 school districts, a community college, and Northern Michigan University.

A model . . .

Specific elements make up their Tech Prep model. These include:

- eliminating the general track,
- expanding technical education to the seventh grade,
- developing portfolio assessment in the eighth grade,
- using contextual education curricula from CORD and AIT (see newsletter 1, C),
- requiring students to select a career cluster, and
- refining and expanding articulation.

Involved . . .

In the 1992-93 school year over 75 instructors were involved in Tech Prep teams. Additionally, four major corporate sponsors continue to assist with curriculum development and evaluation.

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N•E•W•S•L•E•T•T•E•R 7, A

IN-SERVICE / PRE-SERVICE

Pre-Service . . .

- Include experiences in applied academics, integration of basics, assessment techniques, competency development and measurement, goals and performance standards, techniques and methods of adult/post secondary teaching, curriculum building with a team, leadership, guidance and counseling based on student profiles, nontraditional careers, and business needs and requirements.

- Include experiences in related technologies, basic skill development, self awareness, sequential courses and curriculum, 2 + 2, and cross discipline activities.

- Include experiences in skill application, with on-the-job activities, in internships in business, in multiple jobs, at work sites, in non-text activity.

In-Service . . .

Most pre-service education today is not designed for the Tech Prep concept. In time this will change; however, meanwhile persons exiting a teacher preparation program cannot be expected to fully understand the conflicts between the text/lecture delivery of traditional educational programs and the newer method of experience/reasoning. In-service is required.

In-service programs will be a much needed component of all instructional programs. There are certain elements which should be reflected in *all in-service* activities:

1. They should be *planned by faculty, staff, and administration* around identified weaknesses of those personnel. Look for things you do not understand, things you question and things of which you are just not sure.

2. *In-service time is limited;* use it wisely. Don't concentrate on areas which are familiar to personnel. Prepare the agenda, address the items, and get back to business.

3. *Be practical!* Deal with day-to-day issues of personnel as much as possible. Sometimes it is necessary to review overall concepts and philosophy, however, "overkill" is easy with these programs.

4. *Listen to the group* for ideas, problems, suggestions; jot them down; keep a master list of in-service ideas going. Address the list.

5. Make in-service a *part of the assignment.* It should be "in the job description", "expected", "planned for", "routine", and "paid for."

6. Bring in *new ideas* to discuss. If a person goes to a conference, have them do an in-service for the others. If someone suggests ideas, have a committee research and report. Arrange controversial topics to be openly debated.

7. *In-service is not* a faculty meeting to discuss administrative issues, a gripe

session, a grievance procedure, etc. Separate administrative and in-service issues.

In-service should develop a person professionally!

METHODS OF IN-SERVICING

workshops
seminars
communications
conferences
observation of other programs
discussion groups
travel
working in the field
reading
cooperative teaching
cross discipline committees
professional meetings

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PHASES OF TECH PREP
[adapted from Getting Started in Tech Prep, CORD]

Planning begins with a small group of leaders developing a vision. The group grows by engaging other leaders in business and education. It eventually includes a variety of educators, employers, and community leaders.

Planning includes activities to develop awareness, provide information and testimonials, organize and develop a collected vision, gain commitment from participating groups, and come together as a team.

Designing is the next phase. The components of Tech Prep are identified, defined, developed, assigned, and scheduled. Included in these activities:

1. Curriculum/courses
2. Student guidance and counseling
3. Information, promotion, marketing
4. Staff development
5. Articulation policies/procedures
6. Articulation agreements
7. Implementation activities/programs

Much of the design will be conducted by committees. These committees must remain coordinated with a free exchange of ideas and information.

Implementation activities involve preparation for the actual curriculum and classes to begin. Appropriate instructional materials, facilities, equipment, and supplies are obtained. Teachers and counselors are required by the federal legislation to receive in-service jointly between secondary and post secondary institutions.

Be sure to maintain contact with parents and community groups, as well as the students. *Keep everyone informed!*

Evaluation/Improvement begins with the first activities and continues forever. Key questions include:

1. Is the program achieving the stated goals?
2. Is the program being implemented in accordance with the design plan?
3. Are students and employers benefiting from the program?

Specific measures for schools include enrollment, retention, and achievement of course objectives. For employers, measurement of success is keyed to the number and quality of graduates interested in and qualified for jobs and job performance.

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REMEMBER: **PLAN, PLAN, PLAN**

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N•E•W•S•L•E•T•T•E•R 7, B

PUBLIC RELATIONS

Public relations is vital. It is sometimes left until last and sometimes overlooked. For Tech Prep to work, public relations must be a part of the entire process beginning as early as possible. If public relations is not already part of the local Tech Prep process, it is not too late, nor is it too soon. Some public relations activities are essential if Tech Prep is to be accomplished.

THE AUDIENCE

Public relations activities are usually thought of as press releases for the "general public," unknown people (out there, somewhere). In fact the audience in public relations is also people with whom everyone works everyday. **Remember, inform everyone, again and again.**

In Tech Prep the audience includes groups such as:

- students
- parents
- business people
- *faculty members
- *administrators
- *board members
- public servants (elected and agency)
- civic groups

* = both postsecondary and secondary

OPPORTUNITY FOR TEAMWORK

Public relations is an opportunity. People who believe that Tech Prep is the right thing to do came to that conclusion primarily on the basis of information and discussion. Everyone who will be affected by the process of Tech Prep or the results of Tech Prep need to have the opportunity to obtain information, discuss the information, and arrive at their own conclusions about the value and direction of Tech Prep. Public relations is the vehicle to start this process.

Just as the Tech Prep curriculum supports teamwork as a means to higher quality and productivity, the public relations effort is also teamwork. The law requires that the Tech Prep curriculum development process include both secondary and postsecondary faculty. Public relations efforts need educators and business people to collaborate in much the same way.

PREPARE WHAT TO SAY

Tech Prep has a terrific message. Key on the benefits that will be realized once Tech Prep is in place:

- higher retention of knowledge
- ability to use the knowledge
- better motivation due to relevance
- skilled employees needed by
  - business
  - industry
  - government
- access to a rigorous sequence of courses
- readiness for good careers
- higher level abilities in
  - math
  - science
  - communications
  - technology
- more enthused, energetic teachers
- collaboration among teachers
- more efficient use of all resources

DETERMINE WHO TO CONTACT

Each school participating in Tech Prep will decide who, how, and when people will be contacted. Consider the following questions when preparing to inform individuals or groups about Tech Prep:

- How will support be built for individual classes and the entire Tech Prep effort?
- Who will be supportive?
- Who will be resistant?
- What misunderstandings may occur?

GENERAL AUDIENCES

- Why are we doing this?
- What is the benefit to students?
- What is the benefit to employers and the economy?
- What is the cost?
- Where does the money come from for this?
- How long will it take to get this done?
- Is Tech Prep working anywhere yet?
- Where is it working?
- How well is it working?

ADMINISTRATIVE AUDIENCES

- Will this require more staff?
- Will this require more equipment?
- Will this require more classroom space?
- Who will supply the funds to implement this?
- Where are the other resources for this?
- Who will enroll the students?
- Why should a student enroll in these classes?
- How will parents feel about their students taking these classes?
- What affect will this have on the drop-out rate?
- What effect will these classes have on students wanting to enroll in four-year institutions?
- What information do counselors need to work with Tech Prep?
- Where will the classes be taught?

FOR TEACHERS

- What will this do to the classes I teach now?
- I don't have time to teach what is required already, how does this get added?
- Where will the classes be taught and who will teach them?
- Will anyone be moved or RIF'd?
- Will I be required to get additional certification?
- Will I get paid more for this?
- Does this include more committee work?
- Who does the curriculum development?

GUIDANCE AND COUNSELING

- Will this help retain students?
- Does this allow students to enter college?
- Can lower level students be placed in these classes?
- What will it take for parents to believe Tech Prep is "as good as" college prep?
- What is a counselor responsible for in Tech Prep?

PARENTS AND STUDENTS

- Why should I (my student) consider this list of classes?
- Will this get me (my student) into college?
- Are these classes just renamed "dumb-dumb" classes?
- Are these classes too hard?
- Are these classes relevant?
- Will these classes help me make money?
- Will these classes help start a career?
- How do I describe these classes to my friends?
- Will this save some college tuition expense?

BUSINESS AND INDUSTRY

- Will this raise our taxes?
- What does this mean for the people I try to hire?
- Do I get any input into this?
- Why should I consider hiring a person who has completed this program?
- What do you want from me?
- Can you teach this to my employees?
- Will this raise the math capability of my employees?

COMMUNITY AND CIVIC ORGANIZATIONS

- Will this raise our taxes?
- Will this use tax money more effectively?
- What benefit will our community get from Tech Prep?
- Will our graduates be able to get good jobs?
- Is Tech Prep a bragging point for our community?
- Will Tech Prep help retain/draw businesses in our community?
- Will this help students to think?

IN GENERAL

- Have one or two handouts, but don't over do it.
- Keep the message positive. Tech Prep is moving to something better, not leaving something bad.
- Send a note of thanks or call to express appreciation after an event.

Coordinated by the Metropolitan Community Colleges for the Northwest Missouri Tech Prep Consortium
Jim Everett, Editor

TECH PREP
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GUIDANCE & COUNSELING

Where do the K through adult education school counselors fit into the overall Tech Prep picture? Isn't this a "high school" thing?

NO! This is *not just a high school thing*. School counselors, *K through adult education,* play a vital role in implementing and explaining Tech Prep. Counselors can assist student and parents in planning a course of study and in explaining what Tech Prep means. Students can be encouraged to take academic and vocational courses that best prepare them for successful careers. Counselors need to be aware of the increased opportunities Tech Prep can provide and promote it appropriately. Counselors can include discussions on Tech Prep in their career counseling activities.

Counselors and all educators must serve as advocates for the opportunities Tech Prep can offer if the needs of all students are to be met.

COUNSELING IN TECH PREP
THE COUNSELOR'S ROLE

Counselors, K - College, and all faculty members can *promote and assist students in career exploration and career development.* Further support can be provided for parents regarding their child's educational development. It is everyone's job--parents, teachers, and counselors--to assist with each student's long range planning for education and career. Counselors and teachers can work to provide increased opportunities for collaboration. This could provide *additional openings for businesses, industries, and labor groups to participate actively* in the total school program. Further, this cooperation should lead to a work force with better decision-making skills, improved pre-employment skills, and an enhanced work ethic.

WHAT TECH PREP CAN DO

Counselors must be aware of what Tech Prep can do for a significant majority of our student population. College bound or not, all students can benefit from strong applied academics and facts about career opportunities. Elementary and middle school students and parents need assistance with decisions about class selection, career paths, and lifelong opportunities.

STARTING TECH PREP

With passage of the Carl D. Perkins Education Act (P.L. 101-392) came the opportunity for schools across the nation to implement real educational reform. The Act requires that funds be used to provide education programs integrating educational basics and the vocational applications through coherent curricular sequences including courses that enable students to achieve both academic and occupational competencies.

The implementation of Tech Prep will succeed only with the *participation of counselors in the process of curriculum reform.* In keeping with the belief that all students can learn, Tech Prep can be the vehicle that eliminates barriers in the learning path for many students. As students

experience success, self-esteem is improved. Also, the desire to learn will be enhanced, and performance at grade level or above can be realized. The blending of strong academic skills with emerging technical skills using the applied method of contextual education will provide a true foundation for success in a Tech Prep curriculum.

MEANINGFUL EDUCATION

The Tech Prep/Associate Degree initiative focuses on providing a meaningful education and career preparation for the majority of high school students who can not or should not attempt to complete a baccalaureate degree in the first four years following high school graduation. In 1992, nearly one-half million young people across the United States were enrolled in Tech Prep/Associate Degree programs designed and developed through collaborative support and encouragement from communities, educators, and employers.

Tech Prep can challenge and prepare students to live and work in a highly technological society. New workers, entering employment for the first time with a Tech Prep background can provide relevant skills and knowledge to help businesses compete in a global economy.

GUIDANCE AND TECH PREP . . . A FIT

The Commissioner of Education for the State of Missouri, has stated: "Guidance as an educational program is a contemporary concept for many administrators and school counselors. School counselors and the programs for which they are responsible have the potential to make a tremendous impact on the lives of thousands of student across our State.

"If school counselors are to reach a majority of the students in the State and provide maximum program benefits for them, they must begin to redirect their efforts. They must focus on the implementation of a comprehensive developmental guidance program. Counseling, consultation, and referral, as parts of a comprehensive program, are vital, but must be kept in perspective within the total program. Guidance must be put into the program framework and can no longer be viewed as an ancillary service." (From the commissioner's opening statement for the "Missouri Comprehensive Guidance--A Model for Program Development, Implementation and Evaluation".)

In the introduction to "Comprehensive Guidance", the need for educational reform is listed as a critical need. "Excellence in Education is a major theme in Missouri education. It calls for a strong and enduring commitment to our public school system and the development of a tangible, concise plan to bring about reform. There is a general belief that our public schools are at a critical point and that some priorities must change if our schools are to provide the education that will enable youth to fully function in society."

THE NEXT STEP

Once counselors gain a better understanding of what Tech Prep is and what it can help students accomplish, the next step is to assist with orientation of the entire school faculty. An important part of the process is how students in their elementary and middle school years can be prepared for new and improved high school class offerings.

Being positive and enthusiastic about the development of a Tech Prep curriculum can make the difference in a smooth transition from our traditional curriculum, teaching methods, and goals to new and exciting concepts of learning. The necessary and critical skills gained can provide an education which truly prepares our youth for the challenges of the 21st century.

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ASSESSMENT

Proper student assessment is one of the requirements of federal legislation. This assessment is necessary whether federal funds are received through the basic grant (Title II) or special programs (Title III). A significant portion of documentation required of schools will be the assessment of students' capabilities, both before and after attending classes. The regulations point to results of pre and post assessments as proof of gains made by students.

NEW ASSESSMENT INSTRUMENTS NEEDED

To obtain information on the attainment of basic and advanced academic skills as well as specific and general job-related skills, schools will employ one or more types of assessment instruments. Literally thousands are available, many with conflicting philosophies.

Many standardized multiple-choice tests have negative effects on students. These effects are unintended but, nevertheless, negative. A movement has begun to use more authentic assessments. The intent is to affect student learning in a positive manner. Unfortunately, the instruments needed for authentic assessments are not yet widely available.

GETTING STARTED

The absence of any authentic assessment instruments setting on schools' shelves will not avoid audit liability in this area. Using currently available tests is a way to get started. However, eventual use of authentic testing will assist rather than hinder student enthusiasm. Further authentic assessments will provide a clearer picture of student abilities to students, instructors, parents, and potential employers.

FOR SCHOOL AND BUSINESS/INDUSTRY

One purpose of an assessment in Tech Prep is to determine the capability of a student related to the "common core of required proficiency in mathematics, science, communications and technologies." The common core must lead to an associate degree or a certificate in a specific career field. Additionally, after students complete the Tech Prep sequence (grades 11-14) they are expected to find employment!

Using properly oriented assessments throughout Tech Prep is essential. Business and industry are much more interested in what a student is really capable of doing rather than how one student compares to another.

Assessment is NOT
making the measurable meaningful.
It IS making the meaningful measurable.

NRTs VS CRTs

Two perspectives on a test's purpose have emerged. One determines the capabilities of students compared to other students: norm-referenced. The other determines the capabilities of students compared to a specific standard: criterion-referenced.

The Iowa Test of Basic Skills and Stanford Achievement Test are two examples of norm-referenced tests (NRTs). These tests take all scores and place results into a "normal" distribution (bell curve).

Criterion-referenced tests (CRTs) seek to compare the capabilities of a student to pre-defined standards. They are a means of evaluating students on performance objectives. These performance objectives make traditional paper/pencil/multiple-choice examinations inappropriate.

THE FAMILIAR VS THE FUNCTIONAL

Most of the teachers and administrators in education today "proved their worth" on fill-in-the-dot examinations. In many educational evaluation classes, the primary purpose was to learn how to write good multiple-choice tests. The traditional emphasis on these tests was to rank students by their relative ability compared to others and to offer quick, easy scoring.

The criterion or objective based test is not designed to pit one student against another. Its design is to challenge the students to demonstrate their abilities against open (not hidden) standards. Contextually supported instruction is the method; criterion referenced assessment is the evaluation.

FILLING IN THE DOTS

Much of the concern expressed by business over the educational process since the middle 1970's can be summed up in the statement, "I don't care how much time they've spent in school if they can't do what I need done." Few jobs require an employee to color in a dot or square, staying neatly inside the lines, using a #2 lead pencil. The SCANS report (see newsletter 2-E) substantiates a need for students to work at higher levels.

Bloom's taxonomy details levels of ability related to knowledge and skill. The lowest level is an awareness, then comprehension. Most standardized tests dwell almost exclusively on these two levels. Many courses have become survey courses . . . so much is covered in so short a time that very little is placed in the context of relevance or usefulness.

HIGHER LEVELS ACCORDING TO BLOOM

In Bloom's taxonomy, higher levels of thinking occur past the level of most tests. Beyond simple awareness and comprehension are more relevant levels: application, analysis, synthesis, and evaluation. Most jobs require employees to apply information and skills, not just be aware of them. Further, technology will force more and more jobs that pay above minimum wage to be held by employees capable of analysis or higher.

DIRECT VS INDIRECT ASSESSMENT

At one end of the direct versus indirect forms of testing is the norm-referenced multiple choice exam. At the other end is performance assessment. Indirect assessments make inferences about what a student should be able to do without actually doing the task. Direct assessment requires the task to be performed.

A student demonstrating the ability to complete skilled tasks has been used in some circles for a long time. Portfolio documentation as evidence of capability is one of the more popular experimental methods of *authentic assessment.*

RESOURCE

Performance Measures and Standards. 1992. (#MDS-388). NCRVE, 800/637-7552.

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DOCUMENTATION & RECORDKEEPING

Documentation is somewhat different if a Tech Prep program utilizes Perkins monies or local resources. Perkins requires most of the documentation items to be in written form for compliance review. Although local requirements may be less restrictive, it is best to keep an accurate accounting of the local plan, objectives, and evaluation in order to justify time, personnel or financial resources for continuation.

It is always best to have documentation in writing.

DOCUMENTATION

A written plan is needed indicating cooperative efforts between secondary (2 years) and post-secondary (2 years). Indicate school districts involved and have them sign the plan.
Identify curriculum to be addressed by program. Clearly outline each targeted area and job availability.
Describe needs assessment process for all participants, especially special populations.
Outline developmental services available to participants.
Detail committees and assignments in writing.
Set standards for basic skills and relay to participants, teachers, administrators.
Write in-service plan for teachers, guidance and others.
Detail in writing the measurements of success.
Have written agreements between schools.
Take minutes of business advisory meetings.
Outline complete delivery system on paper.
Track participants carefully.

RECORDKEEPING

Student Records

Transcripts - Transferring of credit usually happens with a written transcript or a record of courses and grades achieved. Unfortunately these are not standard and grades are not uniform. Transcripts are merely an historic record of courses taken. They are, however, necessary. They are the closest method to uniformity in educational circles. Difficulties arise when using transcripts for recordkeeping. Some (most) are manually imputed, either on paper or transferred from paper to a computer record. Most are time consuming--recording, filing, finding, copying, mailing, receiving, interpreting, etc.

An electronic transfer transcript system would be ideal, simple, and not highly costly. A concern with electronic transfer is security and priority of data. Thus, it seems, manual handling of transcripts will continue.

A Tech Prep project using electronic transfer for transcripts could build a model for further modernization of such systems.

Competencies - a recent adaptation to "credit" by attendance hours is competency evaluation and recording achievement pass or fail. Further development of competencies in achievement measurement is to allow a student to stay with a project until the competency is achieved. *Outcome-based education* uses such a system.

= = > Using competencies for measuring student achievement causes:
1) course objectives to be written,

2) individual student differences to be identified and confronted.
3) new methodologies to be used in courses,
4) more teamwork and problem solving opportunities.

= = > Competency utilization also benefits by:
1) measuring only achievement--not degrees of achievement,
2) allowing varying exit points for students with varying ability.
3) measuring basic skill competency before exiting the student,
4) setting higher standards for student achievement,
5) allowing students not to duplicate instruction.

Competencies must be written, must have a measurable achievement level, must be recorded on individual record, must be similar from location to location and must relate to the field of training.

Assessment - Pre and post assessment of a student is necessary in order to measure gain at the exit point. This assessment should be uniform for all students, may be at the competence or course level, and must be recorded to document achievement. This includes basic skill and job skill attainment.

Tracking (progress) - One purpose of Tech Prep is to offer students a continuous, coordinated program culminating in a degree or post secondary certificate. In order to have such a program, an accurate record of achievement for each individual must be maintained and *must* follow the participant.

All evaluation will be based on the tracking system record. Student progress; achievement; competency development; program effectiveness; maintenance of standards; and other criteria will use the tracking of student record to measure programs.

Program Records

Curriculum should be written clearly, agreed to by faculty users, signed by related faculty, relayed to guidance and filed in the administrative office. Coordination of levels, multiple section agreements, competency determination, all depend on well *documented* and publicized curriculum.

In service plans are ideally kept by the administrative offices, however, they should be distributed throughout the system. Most in-service plans are general in nature (that is they apply to all faculty, etc.). They are more effective when each person's plan is developed and documented on an individual basis, recorded in the administrative office, and measured periodically for progress. Each plan should target areas to a person's needs and should be in agreement with that person.

Group in-service plans should be used for more general topics and new concepts. Thus, they should not be used to encourage or measure personal development.

Articulation agreements should be written, clear, on file, and shared with all interested parties. The term *articulation understanding* is probably more realistic when explaining "agreements." It is a documented record of who, what, when, how much, etc. and causes an "understanding" of 2+2 curriculum development implementation and evaluation. Without written documents an effective 2+2 program is, at best, difficult to achieve.

Evaluation of program, instructor, curriculum facility, or any item should be written, on file in the administrative office and shared with all parties. It should be used as objectively as possible with measurable standards.

Evaluation should happen annually at the institutional level with results filed in the administrative office, thus allowing for quick reference and review when planning in-service or personal development plans.

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ACCOUNTABILITY

ANNUAL COMPLIANCE
(Monitoring of funded Tech Prep programs)

State staff will conduct *on-site visits* and will direct their inquiry to the following items. Written responses need to be prepared to these items or present documents and other pieces of information that demonstrate compliance.

= = = = =

COMPLIANCE ISSUES

I. Articulation: Provide a written articulation agreement signed by all participating districts in the consortium.

II. Plan

A. Provide a three-year plan for the development and implementation of a Tech-Prep Program which consists of two years of secondary school preceding graduation and two years of high education or two years of an apprenticeship training program.

B. Include the development of a Tech-Prep Education Program curricula appropriate to the needs of the consortium participants.

III. Access for Special Populations

A. Describe the needs assessment.

B. Describe the "developmental services."

IV. Curriculum

A. Provide for a common core of in mathematics science, communications, and technologies.

B. Provide plans for at least one field of engineering technology, applied science, mechanical, industrial or practical arts or trade, or agriculture, health, or business.

C. Provide evidence that the program builds student competence in mathematics, science, and communications

V. Personnel Development

A. Prepare and implement an in-service plan

1. To train teachers.

2. For teachers from all participants in the consortium.

3. Includes training for counselors:

a. Effectively recruit.

b. Ensure that students successfully complete.

c. Ensure that students are placed in appropriate employment.

VI. Annual Evaluation

A. Measures of learning and competency gains in the achievement of basic and more advance academic skills;

B. One or more measures such as:

1. Student competency attainment,

2. Job or work skill attainment,

3. Retention in school and placement rates.

C. With the full participation of special populations.

D. Evaluate for strong experience in and understanding of all aspects of the industry.

TECH PREP EDUCATION

1990 Perkins Act
Selection Criteria for
Approval of Grant Award

I. Project Design

II. Curriculum Design

III. Personnel Development

IV. Evaluation

V. Special Consideration for effective placement activities, business and labor consultation, and retention/re-entry of students

VI. Adequacy of Resources and Commitment

A detailed criteria list is available from
Dr. Robert Robison, DESE
P. O. Box 480
Jefferson City, MO 65012-0480

PROPOSED STATEWIDE STANDARDS FOR VOCATIONAL EDUCATION, 1992

The Perkins Act requires a state wide system of core standards and measures of performance for *vocational education programs*. This system *must* include two measures of assessing performance. One of these *must* be an indicator of learning competency gain of basic or more advanced academic skills.

The other measure may be one of the following:
- competency attainment
- job skill attainment or enhancement
- retention in school
- placement into additional training or education, military, or employment

The system must also include incentives and adjustment that are designed to encourage service to targeted groups or special populations. This is to be reported *before July 1, 1993*.

TITLE II and TITLE III

Under Title II--Basic State Grants: Tech Prep programs must:
- be of size, scope and quality to be effective,
- integrate academic and vocational education through a coherent sequence of courses,
- provide equitable participation.

Under Title III--Special Programs: Tech Prep consortium projects must provide:
- planning and demonstration for development and operations of four-year programs leading via Tech Prep to an associate degree or certificate,
- strong, comprehensive links between secondary and post secondary educational institutions.

ADDITIONALLY

Tech Prep Programs should:
- offer employment placement,
- transfer to four-year baccalaureate programs,
- be developed in consultation with business,
- address drop out prevention and reentry.

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GUIDANCE & TECHPREP

IT'S FOR COUNSELORS . . . TEACHERS . . . EVERYONE!

THE FOCUS IS ON STUDENTS

Tech Prep is an innovative educational approach providing students with the academic and technical foundations for working and living in an increasingly technological world. It is directly centered on the students. Focusing on students provides a natural alliance with school guidance in general and counselors in particular.

Tech Prep is being discussed in every corner of the state. School counselors are asked to be a part of the team to infuse the concepts of Tech Prep. The effort must be a *team effort*. Counselors guide, but also instruct. Teachers instruct, but also guide.

TECH PREP AND MODEL GUIDANCE

Tech Prep, the Missouri Outstanding Schools Act, and the federal School-to-Work initiatives include specific guidance activities to be accomplished. Are these legislative initiatives compatible with the Comprehensive School Guidance Program, or are they pulling in separate directions?

All these initiatives have a common focus in reaching all students with relevant instruction and career pathways based on students interest and abilities. Another common aspect is the push for articulated plans for the student's future. This is a sequence of instruction spanning secondary and postsecondary schools. Together these major strands provide a focus and provide a long-range, long-term, positive result for students!

SUPPORT FOR THE VISION

Before Tech Prep and other legislation, the Comprehensive School Guidance Program was envisioned and developed by educational leaders in Missouri. Each legislative initiative speaks to guidance as an essential ingredient for student success. Tech Prep requires the guidance staff to be an integral part of the effort and provides resources to assist.

GUIDANCE + TECH PREP = WINNER

Schools implementing the Comprehensive School Guidance Program find Tech Prep very helpful and compatible. The chart on the reverse side outlines activities within the Comprehensive School Guidance Program. Those items marked with ■ ***bolded italics*** show a broad base of mutual support between Tech Prep and the guidance model.

The chart shows that a school district fully implementing a comprehensive guidance program is doing what is necessary and important for their students. Expanded efforts in education and counseling for all students is in accord with the vision of Tech Prep. Students benefit from regular, individual activities in planning for their future.

IT'S A MATCH

When schools move forward with Tech Prep and the Comprehensive School Guidance Program, everyone wins. Each initiative supports and encourages the other. When students benefit, that's success.

Coordinated by the Metropolitan Community Colleges for the Northwest Missouri Tech Prep Consortium
Jim Everett, Editor

FOUR COMPONENTS OF A COMPREHENSIVE SCHOOL GUIDANCE PROGRAM

(■ ***TECH PREP*** related activities are in ■ ***Bolded Italics***)

Guidance Curriculum	Individual Planning	Responsive Services	System Support
Provides guidance content in a systematic way to all students K-12.	Assists students in planning, monitoring, & managing their personal and career development.	Addresses the immediate concerns of students.	Includes program, staff, and school support activities and services.
PURPOSE Student awareness, skill development, and application of skills needed in everyday life. AREAS & ACTIVITIES ADDRESSED ■ ***Career Planning/Exploration*** Career Awareness Career Exploration ■ ***Knowledge of Self & Others*** Self Concept Conflict Resolution Personal Responsibilities Peer Relationship Decision Making Skills Substance Abuse Prevention Program Cross Cultural Understandings ■ ***Educational & Vocational*** Development Planning Programs of Study Pre-Employment Skills Job Preparation Post High School Decision-Making (transitioning)	PURPOSE Student educational and occupational planning decision making and goal setting. TOPICS ADDRESSED ■ ***Educational*** Course Selection Transitioning: grade to grade; school to school, school to work Four Year Plan Financial Aid Available ■ ***Career*** Knowledge of Career Opportunities Career Awareness Interest Inventories Career Shadowing Work Habits ■ ***Personal Social*** Setting personal goals Self improvement planning	PURPOSE Prevention, Intervention TOPICS ADDRESSED o Academic concerns o School-related concerns tardiness absences & truancy misbehavior school avoidance drop-out prevention o Relationship concerns o Physical/Sexual/Emotional abuse o Grief/loss/death o Substance abuse o Family issues o Sexuality issues o Coping with Stress	PURPOSE Program Delivery and Support PROCESSES/PROCEDURES o Guidance program development and management ■ ***Parent education*** o Teacher/administrator consultation ■ ***Staff development for educators*** o School improvement planning ■ ***Counselor professional development*** o Research and publishing ■ ***Community outreach*** ■ ***Public Relations***
COUNSELOR ROLE Structured Groups Consultation Guidance Curriculum implementation	COUNSELOR ROLE Assessment Planning Placement	COUNSELOR ROLE Individual and small group crisis and development counseling Consultation Referral	COUNSELOR ROLE Program Management Consultation Coordination

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. . . AND IN THE CLASSROOM, *IT WORKS!*

The reactions come from many groups. Teachers are rejuvenated. Students are motivated. Counselors find many people willing to collaborate. Administrators achieve improved curricula. Parents and the community find a new level of excellence and energy in their schools.

What evidence exists that the curriculum and classroom instructional methods are really as good as some are saying? Everyone in education has seen "the latest and greatest" of ideas come and go. The hard questions are: Do the students benefit? Do the changes contribute to needs of the community?

Educational Improvement

Application/contextual-based courses such as the principles of technology, biology/chemistry, communication, and mathematics have to answer these questions and rightly so! Change should be for the better.

Are these curricula really rigorous in content? The following comments from students and teachers provide some insight to the successes and challenges of applications-based curricula.

From teachers:

- It doesn't water down anything. It's just a whole new approach.
- I feel the class was successful. The students like the approach and the application to real world problems. If we can obtain funding we will expand the offerings to the second year.
- This class has increased enrollment in advanced biology by thirty-three percent.
- The counselor selected the struggling students who didn't like math to be in my class. Of the forty-eight students enrolled, forty-one have asked for the second year of this course. Eighteen of these students don't need any more math for graduation.
- Because of the activities, failures in my class have dropped from 18% to 2% while student participation and enthusiasm has increased.

From students:

- You better sign up for the next class. This is stuff you are going to need to know.
- How do some people describe math? Boring, stupid, tough. Well, I think they should give this class a chance. I was one of those students. This class helps me understand much more about math and how to work problems.
- This class makes more sense to me.
- Even though this is a math class, it's lots of fun.
- It is a lot different from algebra. Not only

do you learn how to do something, you also learn how to apply it.

- This is the most fun thing we've ever done (a micro-organisms lab).

- I love this class! It's helped me learn a lot of things in a faster, easier way than any other math class I've ever been in. And it shows you where and when you can use algebra.

- I don't like word problems, so I don't care for this course.

THE DIFFERENCE

The curriculum is "different" because of the classroom methodology used. Traditionally, teachers have not had the opportunity to learn the applications to the content of their classes.

It is unfair to expect teachers to just pick-up a new curriculum (taught in a new way, and with some new content) and just start teaching. Good workshops are available. These workshops are taught by experienced classroom teachers who face students, parents, and peers everyday.

GOOD DATA

Principles of Technology

A case study from Auburn University involved over 500 students and 23 teachers. Students were evaluated using nationally recognized high school physics examinations.

Conclusions . . .

"Based on the data analysis, given a set of malleable student and teacher variables, it was concluded the *Principles of Technology* is a sound academic course, equivalent to physics, in terms of student performance on a test of physics (mechanics, heat, electricity) items. Under that conclusion, education counselors should not hesitate to encourage both college-bound students (both 2- and 4-year) and students who will upon high school graduation immediately enter the engineering-related technology/mechanical work force to enroll in *Principles of Technology* courses.

Baker, Wilmoth, and Lewis
Auburn University

Applied Mathematics

Green County, NC schools took the most recent California Achievement Test (C.A.T.) scores of students entering General Math or *Applied Mathematics* for the 1989-90 school year. After completion of the these math courses, the C.A.T. was readministered. Both groups had comparable pretest scores. The students taking *Applied Mathematics* showed greater improvement in the posttest scores than did the General Math students.

vs. Algebra . . .

For the 1990-91 school year, Green County again compared C.A.T. scores for students completing *Applied Mathematics* Units A through 22 with scores for students completing Algebra-I. Both groups showed essentially equal scores. These equivalent scores occurred even though *Applied Mathematics* students had not yet covered the five algebra units found in units 23 through 33 (factoring, patterns and functions, quadratics, systems of equations, and inequalities).

It is encouraging to see that in this evaluation, students completing only units A through 22 did as well as students completing Algebra-I. A teacher commented, "The increase in student confidence is incredible!"

Green County School Distnct, NC