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ABSTRACT

Because tech prep has the twin goals of preparing students for entry into postsecondary/continuing education or the work force after high school, tech prep programs require significant modification of conventional curricula and teaching methodologies. Both research and experience have demonstrated that the ability to transfer learning from one situation to another must be learned and that such learning is most effective when students are highly motivated, active participants rather than passive recipients of information and are taught within a contextualized environment. As a strategy for improving the learning environment, integration has three dimensions. The horizontal dimension involves multiple linkages among areas of the curriculum that are currently considered specific disciplines, the vertical dimension involves not only direct links among the different levels of education but also reconsideration of the sequencing of content in given areas of study, and the third dimension involves connecting new knowledge with work and life experience. This third dimension of integration is the basis of applied academics. Two curriculum models based on the three-dimensions of integration are the curriculum clusters model and the value-centered curriculum model. Each may be adapted to tech prep programs. (Contains 17 figures.) (MN)

Contextual Learning and Tech Prep Curriculum Integration

A Presentation to

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December 2, 1993

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AVA Pre-Convention Workshop

Contextual Learning and Integrated Curricula
— *Tech Prep and Vocational Programs* —

Walter Edling, Vice President for Service Programs
Center for Occupational Research and Development

December 2, 1993

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I. Tech Prep and Curriculum Reform

A. Educational Issues

When designing Tech Prep curricula, it is important to keep in mind the educational reform issues that are at the root of the tech prep movement. Much of the early impetus for reform has emerged from the changing nature of vocational education. The rapid evolution of technology and resulting changes in the work place make it necessary to enhance the academic content of vocational programs if students are to be able to deal with new technical devices and other changes in the workplace. Employers are becoming increasingly critical of the educational preparation of individuals they hire in all areas, not just vocational occupations. It is increasingly important that workers are capable of learning new skills and progressing in careers and that newly hired workers have the basic skills to be able to become productive immediately.

Another aspect of educational reform stems from the recognition that a meaningful high school education is important for every member of society. General, unfocused programs at the secondary level do not produce graduates who are capable of going to work nor are they prepared for further education. Recognition of the so called neglected majority places new demands on educational curricula.

B. Curriculum and methodology

Tech prep curricula have been given varying definitions. In the broadest view, tech prep movement may be identified as a set of principles that guide a process of curriculum reform leading to desired improvements in the educational system. More specifically tech prep curricula are recognized as an integrated and articulated approach to addressing high school and postsecondary curriculum in a coordinated fashion. The process of development necessarily involves a joint effort on the part of high school and college teachers, especially those in the two year college environment. Tech prep programs seek to address the needs of all students who do not elect a college preparatory curriculum and have the twin goals of preparing students for entry into postsecondary or continuing education as well as the option of going to work at the end of high school. These goals of tech prep education are very demanding and require significant modification in curriculum as well as the methodology of teaching. Furthermore, changes in curriculum and methodology can be effective only if significant changes also occur in school administration and governance.

II. Contextual Learning

A. Traditional beliefs about learning

Figure 1 contains criticisms of our current education system that have been voiced by Anthony Carnevale. Similar criticisms have been voiced by many others and focus on the fragmentation of the educational process and its lack of attention to the context and integration of the learning experience. The comments by Sue Berryman in Figure 2 represents a more formal, research-based analysis of traditional beliefs about the teaching/learning process that have been found to be incorrect. These issues must be addressed in the development of tech prep programs and curricula.

We are finding that the ability of students to transfer learning from one situation to another is in itself a skill that must be learned. Our focus in the education system has been largely on learning of factual information without much focus on application of that information. Research shows that learning requires active participation on the part of the learner and very little learning occurs if the students are treated as passive receivers of information. Memorization or the bonding between stimuli and responses is a very poor, inefficient, and nonmotivating approach to learning. And finally the human brain is a very contextual device that requires an opportunity to place new knowledge in a context or relationship to other information that has been learned. Learning is greatly strengthened if concrete examples or situations familiar to the student can be brought in to play in the learning process.

B. Emerging research and experience

Much of the structure of education and the testing methods that are used to evaluate learning are based on an assumption that intelligence is predominantly verbal and logical (mathematical) in nature. Howard Gardner has demonstrated in his work at Harvard that intelligence takes many dimensions including musical capabilities, spatial intelligence, kinesthetic abilities, and skill in interpersonal and intrapersonal relationships. These other forms of intelligence are very important in most jobs and in every day living but are not significantly addressed in the design curriculum and the learning process. One of the great strengths of vocational programs has been the fact that they address some of the other forms of intelligence. We are now beginning to recognize the value of the total span of intelligence and are beginning to understand the limitations that we place on the learning process by focusing only on verbal and logical skills.

Figure 3 represents an analysis of the learning process by D.A. Kolb from the Massachusetts Institute of Technology. He represents the learning process by two dialectical dimensions represented by vertical and horizontal lines in Figure 3. The vertical line represents the method by which individuals receive or take in information as part of the learning process. For some people a thinking or analytical process is preferred, while for many others an experiential or feeling process is involved. The horizontal dimension represents the manner in which people internalize or process the information once they have received it. Both dimensions are necessary if learning is to occur. On the horizontal scale some people prefer a passive or observant processing of information. They are comfortable with thinking about information or processing it

... American schooling sequesters students from the real world,

- breaks knowledge down artificially into theoretical disciplines,
- breaks disciplines down into component pieces,
- and demands that students commit fragments of knowledge to memory.
- Applications are reserved for pen-and-paper exercises at the back of the chapter.
- Interdisciplinary applications are rare, and applications in the context of working groups are even more rare.

America and the New Economy
Anthony Patrick Carnevale
ASTD/USDOL, pg. 14, 1991

F133

Figure 1

FIVE ASSUMPTIONS ABOUT LEARNING—ALL WRONG

1. THAT PEOPLE PREDICTABLY TRANSFER LEARNING FROM ONE SITUATION TO ANOTHER.

2. THAT LEARNERS ARE PASSIVE RECEIVERS OF WISDOM—VESSELS INTO WHICH KNOWLEDGE IS POURED.

3. THAT LEARNING IS THE STRENGTHENING OF BONDS BETWEEN STIMULI AND CORRECT RESPONSES.

4. THAT LEARNERS ARE BLANK SLATES ON WHICH KNOWLEDGE IS INSCRIBED.

5. THAT SKILLS AND KNOWLEDGE, TO BE TRANSFERABLE TO NEW SITUATIONS, SHOULD BE ACQUIRED INDEPENDENT OF THEIR CONTEXTS OF USES.

REF: Sue E. Berryman, Director, Institute on Education and the Economy, Columbia University.

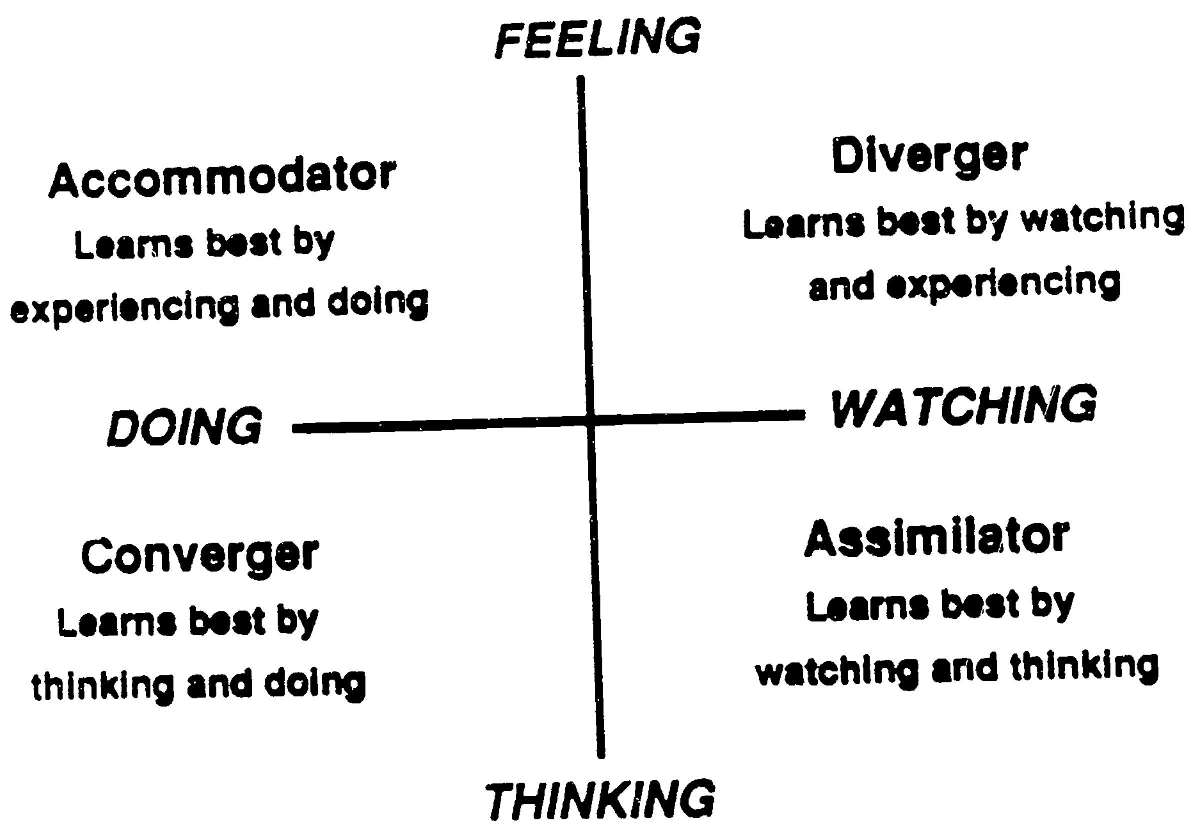
Figure 2

Learning Styles

D.A. Kolb

MIT School of Management

Experiential Learners



Analytical Learners

Figure 3

internally without interacting with the environment. Others have a need to do something actively with the information such as talk with others, experiment, manipulate examples of the information, or develop applications for the information.

Since each person has a preference on the vertical scale and the horizontal scale, they will tend to fall in one of the four quadrants identified as Accommodator, Diverger, Converger, or Assimilator. The majority of the population tend to fall toward the left side and toward the upper portion of the diagram; however much of our teaching and learning has been focused on the lower right hand quadrant.

Another dimension of the learning process that is gaining significance has to do with the motivation of students. At one time we thought that learning could be most efficient if it were actually unpleasant and presented in authoritarian and highly disciplined environment. As is the case with the evolution of management theory, we are now recognizing that students ultimately learn only when they chose to and that effective learning cannot be forced.

Figure 4 is a summary of the factors that have been significant in the learning process. The six bullets form the guidelines for development of tech prep curriculum. The significance of these guidelines can be further understood by examining the results of the SCANS report shown in Figure 5. Examination of these eight parameters reveals that the only one based on factual information is the basic skill in reading, writing and mathematics. The other seven parameters involve aspects of learning that are not well addressed in current education system and each of them can be traced to one or more of the issues shown in Figure 4.

There are two observations about the SCANS results that are very interesting. First, the skills competencies and knowledge identified in the report are independent of any reference to specific occupations. They apply equally to doctors, lawyers, auto service technicians, clerical workers, and others. Second, the skills, competencies, and knowledge are defined in terms of outcomes rather than elements of subject areas. In other words knowledge is defined in terms of how people will use it rather then in bits and pieces of facts and isolated ideas.

It can be seen that curriculum development is a very complex process if all of these factors are to be incorporated.

III. Integration of Curriculum and Learning

A. The three dimensions of integration

CORD

What Do We Know About the Learning Process?

- Most people learn best in an experiential manner involving personal participation, physical or hands-on activities and opportunities for personal discovery.
- Learning is greatly enhanced when concepts are presented in a context involving relationships that are familiar to the student.
- Most people relate better to concrete, tangible examples and experiences as opposed to abstract, conceptual models.
- Most people are extroverted learners and learn best through interpersonal communication, group learning, sharing, mutual support, team processes and positive reinforcement.
- Rote memorization is an inefficient and ineffective learning strategy.
- Transfer of learning from one situation to another is not consistently predictable and the ability to do so is a skill in itself to be learned.

Figure 4

THE FOUNDATION — competence requires:

- 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.

COMPETENCIES — Effective workers can productively use:

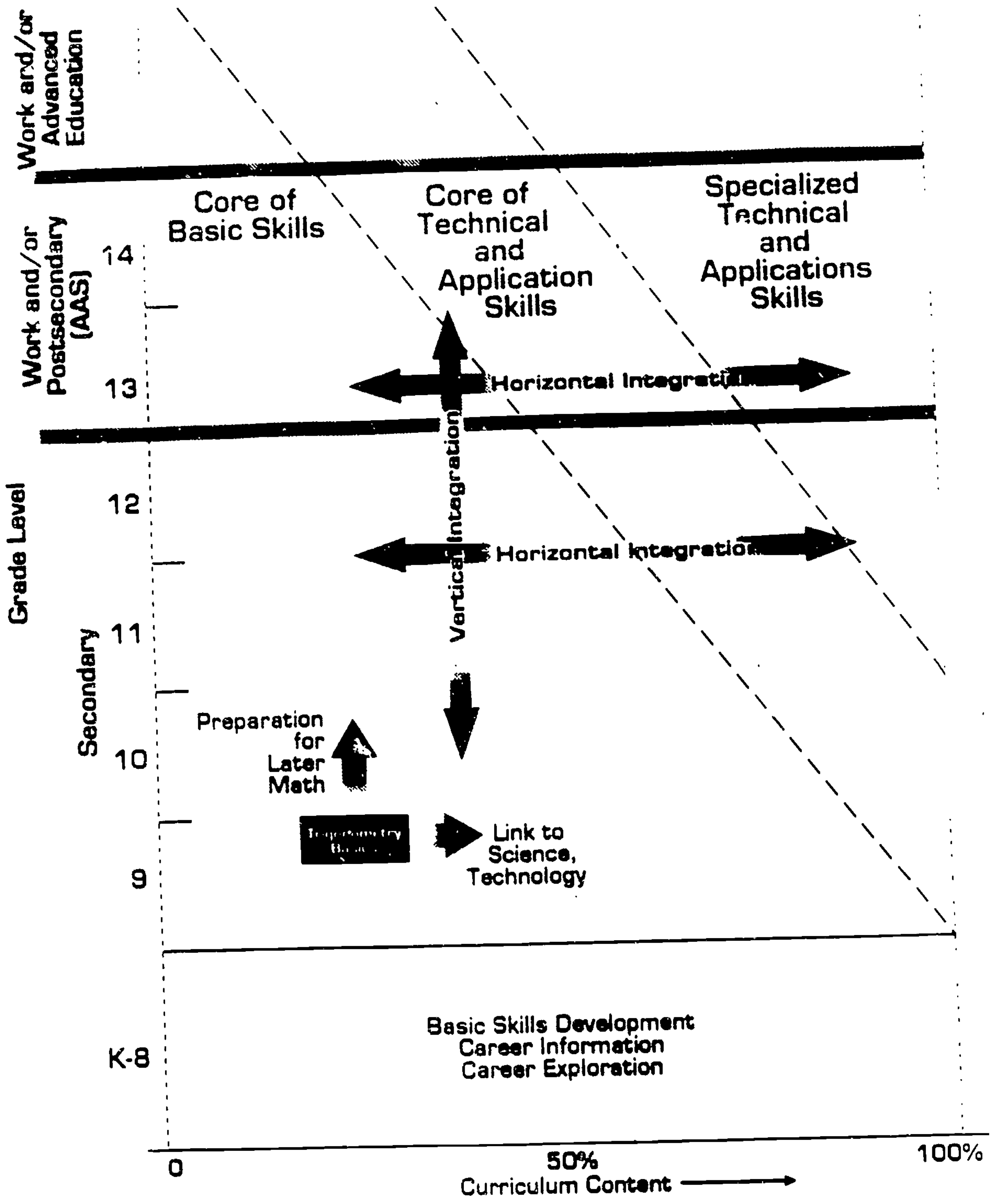
- Resources — allocating time, money, materials, space, and staff;
- Interpersonal Skills — working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
- Information — acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;
- Systems — understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;
- Technology — selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

What Work Requires of Schools. A SCANS Report for America 2000. A Letter to Parents, Employers and Educators. The Secretary's Commission of Achieving Necessary Skills, U S Department of Labor

F-2.2

Figure 5

Integration in Tech Prep Curricula



F-234

Figure 6

One strategy that is achieving success in addressing the multitude of issues described is that of integration. Initially integration has been perceived as an effort to link together vocational content and traditional academic content; however it is now recognized that the concept is much broader. Figure 6 is an overview of curriculum structure from kindergarten to graduate school and employment. It represents two dimensions of integration, horizontal and vertical, and there is a third dimension which could be thought of as a third axis perpendicular to the paper. The third dimension has to do with transition from the classroom to employment and other aspects of living, and is now being recoginzed in curriculum development.

Horizontal integration involves multiple linkages among areas of the curriculum that are currently thought of as specific disciplines. This integration is not limited to academic and vocational education but includes linkages between every traditional course and every other course in the curriculum. This form of integration develops the relationships among facts and addresses the needs to incorporate more context and motivation for the students. Vertical integration involves not only direct links among the different levels of education but also reconsideration of the sequencing of content in any given area of study. The example shown in Figure 6 identifies the basics of trigonometry which need to be introduced at a time when there is direct link to other portions of the curriculum rather than when it is convenient from the view of packaging mathematics courses. Most students do not take trigonometry at all and if they do, they usually take it in the eleventh or twelfth grade. Yet in science and technical areas there is a need for elements of trigonometry as early as the ninth grade, and these should be introduced at the time that they can find direct application in other areas of curriculum.

The traditional structure of algebra, geometry, trigonometry, calculus needs to be reconsidered. It is quite possible and desirable to introduce some elements of calculus as well as basics of trigonometry and geometry much earlier than is current practice. In every case the point of introduction should be linked to the horizontal integration concept, that is to the areas of the curriculum that require the application of the particular topic.

The third dimension of integration has to do with the connection with work and life experiences. Figure 7 displays relationships between school-based learning and work-based learning at various grade levels. This third dimension of integration is the newest to arrive on the scene even though some forms of co-op and other work experience elements have been part of some educational programs for many years. It is only today that the importance of these linkages is being fully recognized and utilized.

The three dimensions of integrations offer a broad framework within which it is possible to address the learning process variables that were described earlier including such things as contextual learning, experiential learning, cooperative learning, discovery learning, utilization of multiple intelligences and student motivation. The integrated

Structure & Purpose of a Tech Prep Curriculum

Outcomes	School-Based Learning	Work-Site Learning	
1. Ready for Work and College 2. Ready for Upward Career Mobility 3. Ready for Retraining	Technical Specialty • *Advanced Skills* • *Transferable Skills* Advanced Academics How to Learn	Technical Specialty • *System Integration* • *Problem Solving* Team Skills	**PS**
1. Ready for Work, Postsecondary, and College 2. Choice of Specialization 3. Ready for Advanced Skills	Occupational Specific Technical Core Additional Academics	• Interpersonal Skills • What Are Basic Tasks of Job in Career Field? • How Do Job Tasks Relate to Technical & Academic Competencies? • Is This Really What I Want to Do? At What Level?	**Grades 11-12**
1. Ready for Basic Technical Skills 2. Career Choice 3. Attitude of a Desirable Worker 4. College or Tech Prep? 5. Interest in remaining in school	Math Science Communications Computers Social Sciences Career Exploration	• The Climate of the Workplace • Employer Expectations of Workers • What Do I Want to Do? • Benefits of Remaining in School	**Grades 9-10**

F205a

Figure 7

curriculum can provide for more effective movement toward development of desired learning outcomes as they're being identified today. The recommendation of the SCANS report can be more readily incorporated in integrated approach. Interpersonal skills, creativity, the ability to view a system as a whole, the ability to transfer and apply learning can all be better addressed through an integrated curricular approach.

B. The role of applied academics

The earliest efforts to develop the integrated curricular concepts have resulted in applied academics courses in math, communications, physics, biology, and chemistry. The basic structure of applied learning is based on processes that incorporate examples drawn from everyday experiences in personal, societal and occupational life and provide concrete, hands-on application of the material to be learned. Figures 8 and 9 show the Applied Mathematics course topics in which vertical integration has been accomplished by drawing upon topics from many traditional course areas. Horizontal integration is accomplished by weaving into the course materials many applications of mathematics in concrete situations that students can identify. The course involves laboratory experiences that use every day equipment and devices that students can manipulate.

Figure 10 represents the organization of the course material in Applied Physics which is taught in a manner that develops analogies between and among various systems to assist the student in understanding the concepts from different perspectives. Thus the concept of force is applicable not only in mechanical system as a push or a pull which causes a change in motion but it is also relevant to a fluid system where a pressure gradient acts in the same fashion as a force to change the motion of a fluid. In electrical systems the quantity called voltage causes a movement of electrical charge and therefore functions in the same fashion as a force. In a thermal system the temperature gradient causes thermal energy to move from a region of high temperature to a region of low temperature.

Development of these analogies assist the student not only in understanding the concept by viewing it from various perspectives but also it develops the ability of a student to regard the physical world as a connected system where all of the elements interact and relate to one another.

The concept of integration in subject material and applied course materials is not limited to science and technology. Figure 11 shows an example of work being done to extend the same concepts to the area of humanities. Approaches such as this South Seattle Community College project funded by Boeing Corporation are a major departure from the traditional course structure in which all the elements of curriculum have been built around specific disciplinary knowledge. In the integration approach the focus shifts from a course title to a broad area of desired student outcomes. To develop those

APPLIED MATHEMATICS - YEAR ONE

PREPARATORY UNITS

A	Getting to Know Your Calculator	REVISITING FRACTIONS, DECIMALS, PERCENTS WITH THE HELP OF A CALCULATOR
B	Naming Numbers in Different Ways	
C	Finding Answers with Your Calculator	

APPLIED MATH UNITS

1	Learning Problem-solving Techniques	BASIC MATH SKILLS THAT EVERYONE NEEDS
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	GEOMETRY
7	Working with Shapes in Two Dimensions	
8	Working with Shapes in Three Dimensions	
9	Using Ratios and Proportions	BASIC SKILLS IN ALGEBRA
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	

M-12 January 3, 1991

Figure 8

APPLIED MATHEMATICS - YEAR TWO

16	Solving Problems That Involve Linear Equations	BASIC SKILLS IN ALGEBRA
17	Graphing Data	
18	Solving Problems That Involve Nonlinear Equations	
19	Working with Statistics	QUALITY CONTROL
20	Working with Probabilities	
21	Using Right-triangle Relationships	INTRO TO TRIGONOMETRY
22	Using Trigonometric Functions	
23	Factoring	HIGHER SKILLS IN ALGEBRA
24	Patterns and Functions	
25	Quadratics	
26	System of Equations	
27	Inequalities	
28	Geometry in the Workplace 1	APPLICATIONS OF GEOMETRY IN THE WORLD OF WORK
29	Geometry in the Workplace 2	
30	Solving Problems with Computer Spreadsheets	USING COMPUTERS TO SOLVE PROBLEMS
31	Solving Problems with Computer Graphics	
32	Quality Assurance and Process Control I	PRACTICE AND APPLICATIONS OF QA QC IN THE WORKPLACE
33	Quality Assurance and Process Control II	

M-12a

January 3, 1991

Figure 9

PRINCIPLES OF TECHNOLOGY

ORGANIZATION OF COURSE MATERIAL

TECHNICAL CONCEPT	Subunit 1 MECHANICAL SYSTEMS	Subunit 2 FLUID SYSTEMS	Subunit 3 ELECTRICAL SYSTEMS	Subunit 4 THERMAL SYSTEMS
UNIT I (FORCE)	• Video • Principles • Math Lab • Hands-on Labs	••• { same } •••	••• { } ••••	••• { } •••
UNIT II (WORK)	• Video • Principles • Math Lab • Hands-on Labs	••• { } •••	••• { } ••••	••• { } •••
	• • • • • • • •	• • • • • • • •	• • • • • • • •	• • • • • • • •

Figure 10

19 20

Seattle Tech Prep
Applied Academics Project

Course Materials in Applied Humanities

- o Critical Thinking and Work Place Ethics
- o Responsibilities and Rights in a Free Society
- o History of Technology
- o Applied Esthetics

Curriculum Development Sponsor:
Boeing Corporation

Dissemination Sponsor:
U.S. Department of Education Grant Number V248A20032

Prepared by:

South Seattle Community College
Advanced Technology Center
Applied Academics Project

Figure 11

student outcomes, learning is drawn from a variety of subject areas and is presented in a systemic approach which develops the context and perspective for the student.

A variation on this same theme has been undertaken by Edison Community College in Piqua Ohio under leadership of the Academic Vice President Dr. Sharon Coady. The faculty of Edison have voluntarily agreed upon six core values and are attempting to explicitly build each of the core values in to every one of the existing courses. This approach has the effect of unifying and linking together courses in yet another manner. The core values they are using include communication skills, ethics, critical thinking, cultural diversity, inquiries/respect for learning, and teamwork/interpersonal skills. It is evident that the use of these core values will help to address the SCANS issues as well as the matters of context in integration of curriculum.

IV. Curriculum Models

A. Curriculum clusters

Figure 12 and 13 display the typical arrangements in which the applied math and applied science courses are utilized in curriculum design. Figure 14 represents a typical approach to the use of clusters in curriculum design. A specific application of this model is shown in Figure 15 and represents a curriculum that is being implemented at the Dothan public schools at Dothan Alabama. Additional details are provided in Figure 16. Of particular interest in the Dothan model is the fact the ninth grade curriculum is virtually common to all students including college prep and tech prep students. The only variant in the curriculum involves the choice of applied versus traditional mathematics and applied versus traditional approaches to science. It should also be noted that a course called Keyboarding, Computers, and Workplace Readiness is required of all students. This is a course that is essentially vocational in nature and would very likely be taught by vocational teachers but is a requirement of all students. By using applied course methodologies, the intent is to enable much larger numbers of students to be successful in meeting the same level of academic competence that's been expected of college preparatory students. At the same time a heightened level of job awareness and job readiness is being built in through the vocationally oriented course. Although it is not so well developed at this point, provision has been made for a school-to-work linkage in the summer between the eleventh and twelfth grade.

Figure 17 represents a similar approach applied to an agricultural tech prep curriculum. It is evident in each of these models that curriculum development is in a very early stage. Concepts of integration and contextualization of course materials needs to continue into other areas of the curriculum. At the same time the basic directions and concepts are becoming clear.

Possible Four-Year Secondary Math Sequences

Grade Level	Traditional College Prep	Recommended Tech Prep	Transition Tech Prep	Honors or Advanced Tech Prep
9	Algebra I	Applied Math I	Prealgebra	Applied Units to parallel Algebra I
10	Algebra II	Applied Math II	Applied Math I	Algebra II
11	Geometry	Algebra II	Applied Math II	Geometry
12	Trig/Precalculus	Geometry or Trig/Precalculus or other advanced math areas	Algebra II	Trig/Precalculus

Figure 12

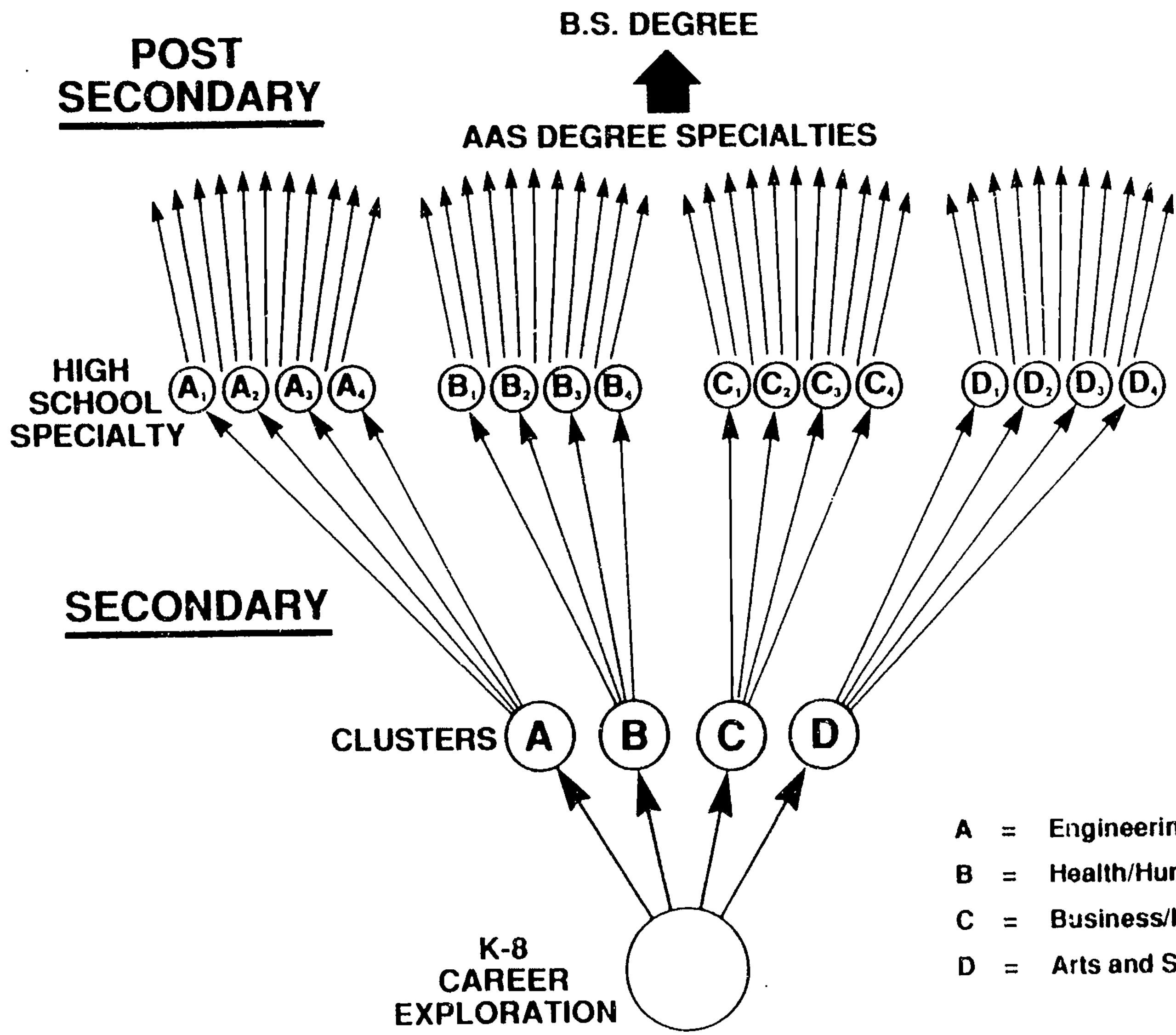
Table _____

Grade	Physics Emphasis	Health Emphasis	Life Science Emphasis	Broad Emphasis
9	*Applied Biology/Chemistry I*	*Applied Biology/Chemistry I*	*Applied Biology/Chemistry I*	*Applied Biology/Chemistry I*
10	*Principles of Technology I*	*Principles of Technology I*	*Principles of Technology I*	*Principles of Technology I*
11	*Principles of Technology II*	Biology	*Applied Biology/Chemistry II*	Elective
12		Chemistry	Biology	Elective
13	Physics for Technicians	Anatomy and Physiology	General Chemistry	Elective
14		Zoology and Microbiology		
Applica-tions	Engineering Technology Industrial Technologies Automotive Construction	Nursing MLT ORT	Human Services Careers Geriatrics Environmental Programs	Business Arts and Humanities

Figure 13

25 26

PROGRAM CLUSTERING FOR TPAD



A = Engineering/Industrial

B = Health/Human Services

C = Business/Info Mgmt

D = Arts and Sciences

Figure 14

WORK	WORK	WORK	WORK
	AAS	BS	BS
		AAS	

WORK BASED LEARNING

INDUSTRIAL/ ENGINEERING	HEALTH/HUMAN SERVICES	BUSINESS/INFORMATION SYSTEMS	ARTS AND HUMANITIES
Auto-Aircraft Electronics Manufacturing Construction Welding	Health Education Human Services Cosmetology Child Care	Accounting Management Marketing Retailing Information	Music- Performing Arts Art/Crafts Humanities

Grades 11-12 Speciality

Basic Design/ Survey of Manufacturing	Intro. to Health Occup./ Human Services	Business	Fine Arts

Grade 10 - Course selected from cluster area

Grade 9 - Computer and Workplace Readiness

Grades 9-10 Common Core
Common core leading to advanced education for all

MIDDLE SCHOOLS

Exploratory - nine weeks of the twelve occupational clusters
Career Planning - DAT level 1 interest inventory
DISCOVERY SOFTWARE
Student Profile Card begins.

Grades 7-8

DOTHAN CURRICULUM MODEL

Figure 15

INDUSTRIAL/ENGINEERING CLUSTER

COLLEGE PREP

Grade	1	2	3	4	5	6
12	English 12	AP Calculus OR Advanced Math Topics OR Trig/PreCalculus OR Algebra II	Physics	Government/ Economics	Foreign Language II	Elective
	Summer Work Experience					
11	English 11	Trig/PreCalculus OR Algebra II OR Geometry OR Applied Math II	Chemistry	American History	Foreign Language I	Elective
10	English 10	Algebra II OR Geometry OR Algebra I OR Applied Math II	Biology	World History	Graphical Communications/ Introduction to Technology	Elective

Choose at least one elective from the following:

AP Chemistry

Principles of Technology

Drafting

Electronics

Manufacturing Technology

INDUSTRIAL/ENGINEERING CLUSTER

TECH PREP

Grade	1	2	3	4	5	6
12	Applied Communications	Algebra II OR Geometry OR Trig/PreCalculus	Elective	Government/ Economics	Specialty	Specialty
	Summer Work Experience					
11	English 11	Algebra II OR Geometry OR Elective	Principles of Technology II	American History	Specialty	Specialty
10	English 10	Applied Math II OR Geometry OR Algebra I	Principles of Technology I	World History	Graphical Communications/ Introduction to Technology	Elective

Specialties

Auto Body Rep.

Automotive Technology

Carpentry

Drafting/ AutoCad

Electrical Trades

Electronics

Manufacturing Technology

Masonry

Welding

GRADE 9

1	2	3	4	5	6
English 9	[illegible]try [illegible] Algebra I OR Applied Math I	Physical Science OR Applied Biology/ Chemistry I	State History/ Consumer Economics	Keyboarding, Computers, and Workplace Readiness	Elective

Elective Choices

Art
Band
Chorus
Home Ec
ROTC
PE

Figure 16

Tech Prep Agricultural Curriculum

Small Grain Farm Management

		1	2	3	4	5	6
Post-Secondary	Grade 14 2nd Semester	Employment Search Skills			Commodities, Futures, and Hedging	Crop Management II	
	Grade 14 1st Semester	Business Writing			Crop Management I		
	Grade 13 2nd Semester	Communication Skills		Land Management and Conservation	Plant Propagation	Plant Destructive Insects and Diseases	Fertilizers
	Grade 13 1st Semester	Human Relations	Mathematics and Agricultural Applications				Soil Science
Secondary	Grade 12	Applied Communications	Math Elective	Science Elective	Government/ Economics	Ag nics	Ag mics
	Grade 11	English	Algebra II or Applied Math II	Principles of Technology II	United States History	imal nce	Plant nce
	Grade 10	English	Applied Math II or Applied Math I or Algebra II or Algebra I	Principles of Technology I	World History	Health/ Driver Ed.	
	Grade 9	English	Applied Math I or Algebra I	Applied Biology/ Chemistry	World Geography	Elective	

Elective choices include: Art, Band, Home Economics, Chorus, Physical Education, ROTC

Core of Basic Skills — Core of Technical and Application Skills — Specialized Technical and Applications Skills

Figure 17