DOCUMENT RESUME

ED 059 369 VT 014 585

AUTHOR	Mayer, Lynne S.
TITLE	Needed: A Compromise in Postsecondary Vocational -Technical Curricula.
INSTITUTION	West Virginia Research Coordinating Unit for Vocational Education, Huntington.
REPORT NO	Rev-Syn-Ser-1
PUB DATE	71
NOTE	58p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Curriculum Planning; Curriculum Problems; Educational Needs; Job Analysis; *Literature Reviews; Manpower Needs; *Post Secondary Education; *Program Design; Program Effectiveness; Relevance (Education); *Technical Education; *Vocational Education

ABSTRACT

Relevant curriculums for post-secondary vocational-technical programs can be designed only after manpower needs are identified and a study is made of job skill requirements. This paper, the result of a review of current literature, was written in an attempt to decide: (1) What programs should be made available at the post-secondary level? (2) What is the appropriate composition of post-secondary vocational-technical education curriculums? and (3) How much time should be spent in the teaching of theory compared to that devoted to practice or application of theory? It was found that an average of 5 percent of the post-secondary curriculums reviewed were composed of general education components, and 15 percent of the curriculums were made up of courses related to job skills. Conclusions were that general and related instruction must be included along with skills instruction in post-secondary curriculums, and that a compromise is needed between programs with rigorous engineering type curriculums and those with short term job skills curriculums. (GEB)

REVIEW AND SYNTHESIS SERIES NUMBER ONE

NEEDED:
A Compromise in Postsecondary Vocational-Technical Curricula

West Virginia Research Coordinating Unit for Vocational Education
Marshall University
Huntington, West Virginia

NEEDED: A COMPROMISE IN POSTSECONDARY VOCATIONAL-TECHNICAL CURRICULA

Lynne S. Mayer

Information Specialist

1971

West Virginia Research Coordinating Unit
for Vocational Education
Marshall University
Huntington, West Virginia

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FOREWORD

Postsecondary vocational-technical educators are becoming increasingly aware of a problem dealing with curriculum design and development. This concern relates to the provision of services and instruction for the postsecondary student. A number of questions need to be answered in relation to postsecondary vocational-technical curricula. What programs should be made available at the postsecondary level? What is the appropriate composition of postsecondary vocational-technical education curricula? How much time should be spent in the teaching of theory as compared to that devoted to practice or application of theory?

The purpose of this paper is to review current literature that addresses the previous topics. Only material with considerations for curriculum design and development in postsecondary vocational-technical education are reviewed. In attempting to locate curricula representing semi-skilled, skilled, and technical areas, the reviewer found the major proportion of references to be in the technical program area.

To obtain an overview of part of the current postsecondary vocational-technical curriculum problem, the following comments by Norman C. Harris concerning engineering technician curricula are relevant.

> ....the central core of the problem was the unreasonable rigor of the curriculum. The courses were actually pitched at an engineering level, not a technician level. Many courses required in the technician curriculum were the same courses as those taught for the transfer engineering students. Analytic geometry and calculus, general chemistry, and engineering physics were required in the first semester of the freshman year. Now there may be some localities where students who have the capacity to become graduate engineers

> will, for some reason or other, decide on a two year degree and technician status, ... I suspect that there are very few such communities.*

Harris further defines technician jobs as middle-level jobs and says that students of middle-level abilities should succeed in technical courses. "When they cannot," he states, "something is wrong and the error isn't with the students."

This paper discusses the following topics of concern in post-secondary vocational-technical education: program identification, curriculum design, instructional programs, curriculum development, and pretechnical and remedial programs. The author wishes to emphasize the fact that this paper is strictly a review of the available literature, devoid of statements reflecting the reviewer's personal opinion.

Lynne S. Mayer

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*Norman C. Harris, "Curriculum and Instruction in Occupational Education," Emphasis -- Occupational Education in the Two-Year College. Addresses and Recommendations Presented at a Conference Sponsored by the Midwest Technical Education Center and the American Association of Junior Colleges by Richard C. Richardson, Jr. (Washington, D. C.: American Association of Junior Colleges, 1966), pp. 51-52.

Definition of Terms

CURRICULUM*: A series of courses providing instruction in any occupational field in vocational education designed to prepare persons for employment at the entry level or to upgrade occupational competencies of those previously or presently employed in any occupational field.

POSTSECONDARY VOCATIONAL EDUCATION*:
Vocational education which is designed primarily for youth and adults who have completed or left high school and who are available for an organized program of study in preparation for entering or re-entering the labor market. Such education may be provided in schools or institutions such as business or trade schools, technical institutions, or other technical or vocational schools; departments of colleges and universities, junior or community colleges, and other schools offering vocational education beyond grade 12. The term shall not be limited to vocational education needs of the persons to be served, particularly high school dropouts require vocational education at a lower grade level.

PROGRAM AREA*:
Refers to the specific preparatory curriculum designed to train workers in technical, management, office, distributive, industrial, agriculture, and the health and public service occupations.

VOCATIONAL-TECHNICAL EDUCATION (postsecondary):
All program areas with training length varying from beyond the twelfth year (in secondary) up to two years; implies less than baccalaureate level training.

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*Vocational Education Local Educational Agency Program Guide. 1972-1972. (Charleston, West Virginia: West Virginia Board of Education, Bureau of Vocational, Technical and Adult Education, 1971), pp. iv-vi.

I. PROGRAM IDENTIFICATION AND CURRICULUM DESIGN

Educators perceive that many factors must be incorporated into the process of developing relevant postsecondary vocational-technical programs. One element is identification of regional manpower needs, from which information can be obtained for use in determining types of training programs to be offered. Once the issue of identifying specific programs to be offered is resolved, designing of relevant curricula depends on determination of existing job requirements through the technique of job analysis. Another component involved in curriculum development is the necessary combination of basic skills and general abilities needed by the individual to succeed on the job. An additional consideration in curriculum design is characteristics of students enrolled in postsecondary programs. This chapter reviews recent literature concerning the following factors:

1. Program identification by determination of manpower needs through skill survey
2. Job analysis as a basis for curriculum design
3. Individual in the occupation: required basic skills and general abilities
4. Student characteristics

A. Program Identification: Determining Manpower Needs Through Skill Survey

The U. S. Employment Service has published a handbook describing a survey technique used to obtain data concerning regional manpower needs. This handbook elaborates upon "occupational job market research", which includes the area skill survey technique, in order to evaluate "job opportunities in relation to available labor supply in a particular occupation or group of occupations."

The description of the area skill survey includes:

> The collection of basic data, mostly from employers, on (1) current employment in selected occupations; (2) employment requirements by occupation for some future date (usually 2 and 5 years hence); (3) training programs and numbers of workers in training; (4) interest in, and need for, pre-employment or supplementary vocational training; and (5) where feasible, data by occupation on recent turnover, hard-to-fill jobs, new and emerging occupations, and the effects of technological change.
>
> In most cases, in order to insure the validity and applicability of the occupational forecasts, an area skill survey should be updated within 2 to 3 years of the initial survey. In updating these surveys, the state should plan to appraise area skill survey findings and their application in the community. This appraisal should include an analysis of employer forecasts. This can be done only where the timing of the updated survey corresponds to the employer forecast periods used in the previous survey or surveys.[1]

Several states have addressed the issue of determining manpower needs by developing procedures to be used in identifying these needs. One such effort by the West Virginia Research Coordinating Unit for Vocational Education (RCU) aids counties in West Virginia in conducting surveys to determine local programs to be offered. Information concerning procedures and objectives, as well as forms, are available from the RCU upon request. These forms include:

1. Student Vocational Interest Survey
2. Parent Interest Survey
3. Business and Industry Survey
4. Part B - Business Survey
5. Part C - Industry Survey
6. Part D - Hospital and Health Service Establishments
7. School Administrators Survey
8. Student Follow-up

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[1]U. S. Employment Service (DOL), Handbook on Employment Security Job Market Research Methods -- Area Skill Survey (Washington, D. C.: Government Printing Office, 1965), pp. 1-3.

B. Job Analysis - Basis for Curriculum Design

Job analysis is defined as "a detailed listing of duties, operations, and skills necessary to perform a clearly defined, specific job, organized into a logical sequence which may be used for teaching, employment, or classification purposes."[2]

Several techniques utilizing job analysis have been developed in research of armed forces agencies such as Human Resources Research Organization (HUMRRO), in Fort Bliss, Texas, and the Personnel Research Division of the Occupational and Career Development Branch at Lackland Air Force Base, Texas.

HUMRRO has divided a generalized procedure for developing technical training into several steps. This procedure is an important consideration in curriculum development. The initial four steps are to:

1. determine the performance required,
2. derive training objectives from performance requirements,
3. base training content on training objectives, and
4. select appropriate training methods.[3]

Raymond E. Christal, an occupational and career development researcher at Lackland Air Force Base, Texas, suggests considerations for curriculum design based on current Air Force research findings.

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[2]American Vocational Association, Definitions of Terms in Vocational, Technical, and Practical Arts Education. (Washington, D. C.: American Vocational Association, Inc.), p. 12.

[3]Harry L. Ammerman, "Systematic Approaches for Identifying and Organizing Content for Training Programs", Process and Techniques of Vocational Curriculum Development, Brandon B. Smith and Jerome Moss, Jr., editors (Minneapolis, Minnesota: Minnesota Research Coordinating Unit for Vocational Education, University of Minnesota, 1970), p. 112.

First, he questions whether energy spent in identifying unneeded training is equal to that spent in consideration of new subject matter. He states that the Air Force saves millions of dollars each year by eliminating course content indicated by job analysis surveys to be obsolete. He also explains the process of collecting occupational data with job inventories, including background information about the worker and his job, as well as about the tasks he performs. Analysis of this data results in a consolidated description of types of jobs and of work being performed by any specified group of workers in the occupational area.

Christal mentions a program to aid curriculum designers in studying career progression in a particular occupational area. This program "computes the percentage of individuals at each experience level performing each task." Thus, it would help with centering curricula on "those tasks which individuals are likely to encounter during their first few years on the job."[4] If employers cooperate, one or more states could survey individuals in relevant occupations in the geographical region serviced by their vocational-technical schools. Data produced by such a survey could be used for curriculum design.

Christal explains the value of considering occupational surveys conducted using job inventories as inexpensive sources of useful data for curriculum design:

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[4]Raymond E. Christal, "Implications of Air Force Occupational Research for Curriculum Design," Process and Techniques of Vocational Curriculum Development. Brandon B. Smith and Jerome Moss, Jr., editors. (Minneapolis, Minneosta: Minnesota Research Coordinating Unit for Vocational Education, University of Minnesota, 1970), p. 35.

> Curriculum design is an art that involves consideration of more than a description of jobs being encountered by graduates of training programs. But such information cannot be neglected......courses built in the absence of good occupational information sometimes have done a poor job of preparing individuals for the work they are later assigned to accomplish.

In order to prepare individuals for a family of trades, as described below, Christal strongly suggests selecting the best sample of tasks. The following are some factors to be considered in task selection:

1. The probability that the task will be encountered by the student at various time periods after graduation
2. The perishability of the skill
3. The cost effectiveness of teaching the task in the formal school setting vs. teaching it in the job setting
4. Frequency of inadequate performance
5. Consequences of inadequate performance
6. Probability that the task will have to be performed in an emergency situation
7. Transferability of the skills
8. Trainability of the skill[5]

The "family of trades" concept, also termed "job cluster" concept, is simply described by Edward J. Morrison of The Ohio State University:

> One examines a wide variety of jobs and sorts them into groups according to the kinds of tasks, skills, knowledge, aptitudes, work habits, or whatever the jobs require for success. Each group or cluster of jobs thus is defined by a set of common requirements. These common job elements, incorporated into the curriculum provide the student with powerful capabilities which are useful in a number of occupations. (There are........) a variety of bases for clustering jobs and several procedures for arriving at curricula once the clusters have been defined, but the general

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[5]*Ibid.*, pp. 36-37.

strategy is essentially the same for all: define a core curriculum based on common requirements of job clusters.[6]

C. Individual in His Occupation: Required Basic Skills and General Abilities Needed of Technicians

The reviewer found few references to basic skills and general abilities except within the area of technical education. Therefore, the following discussion of basic skills and general abilities, needed by the individual in his occupation, will center upon programs to train technicians.

In addition to using job analysis in curriculum design,[7] one must also consider basic skills and general abilities required on the job. Graduates of all technical education programs need to have certain basic skills and abilities in order to survive in modern industrial society. Robert Hays, head of the English Department, Southern Technical Insitute, Marietta, Georgia, relates the importance of three basic "survival skills": receptive skills, projective skills, and communications-related skills.

Receptive skills include the reading of technical, organizational, research and other professional literature, as well as understanding oral

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[6]Edward J. Morrison, "Job Cluster Concept and Its Curricular Implications: Discussion of a Symposium," The Job Cluster Concept and Its Curricular Implications: A Symposium. Center Monograph No. 4, J. W. Cunningham, editor (Raleigh, North Carolina: The Center for Occupational Education, North Carolina State University, 1969), p. 79.

[7]For a more detailed account of research in analysis for curriculum design see: Review and Synthesis of Research: Analysis for Curriculum Development in Vocational Education, Research Series No. 46 (Milton Larson, ERIC Clearinghouse, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio, October, 1969).

communication. Projective skills include public speaking; conference leadership and participation; interviewing; informal speaking; writing business letters, reports, and administrative communications; and business conversation. Communications-related skills include assessing readers and listeners; predicting responses; working within managing office and staff routines; gathering information; designing graphical representations; getting reports, memos, and letters from rough draft ready for a reader; and arranging meetings. Hays justifies the importance of a student obtaining communications skills:

> Communicating skill, backed by logical thinking, is the only skill safe from the competition of electronic, mechanical, or pneumatic equipment. If a student learns mere manipulation, however important such skills, he can only dread the day a computer, a thermocouple, or a telemetry package becomes cheaper and more portable than he is. But he can sell, without fear of obsolescence, his thinking and his creativity.
>
> The lowest levels of work may require little communication, but as an employee rises in salaried, supervisory, and managerial levels, his communicating increases.[8]

Harold P. Erickson reports about a study to determine English needs of technicians. Three hundred seventy-nine questionnaires were sent to industries in Wisconsin, Iowa, and Minnesota.

> The responses indicated that between 57.2 per cent to 69 per cent of the technician's time is devoted to the use of communicative skills. They also suggest that technical reporting represents a major portion of

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[8] Robert Hays, "Reading, Writing, and Speaking: Survival Skills for Technicians," Technical Education News, XXVI, No. 2 (December, 1966), p. 5.

the technician's job, and that this task is about equally divided between oral and written reporting.[9]

The study shows a further breakdown of communicative tasks. Tasks involve writing business letters, writing technical articles, reading technical articles, and oral communication. The technician spends six per cent (6%) of his time writing business letters; i.e. inquiry biddings, requests for specifications, the concise and exact letter of purchase, correct use of application letters, and inner-office memorandums. He spends eleven per cent (11%) of his time writing technical articles, i.e. gathering information and condensing it for a journalistic report.

The technician spends ten per cent (10%) of his time reading for specific job-related information in technical articles, such as those in trade journals and product releases. Industries greatly desire accurate comprehension in reading.

Thirty per cent (30%) of the technician's time is spent in oral communication, which involves the sending or receiving of oral directives. Erickson states that the technician must be able to meet the public and represent the company with courteous service while being able to explain the mechanical aspects of a problem in laymen's terms. He will be conducting product demonstrations, sales meetings, and safety programs. Thus, he must have the ability to speak to groups of people. Industries desire the technician to exhibit the skills of effective listening, as

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[9]Harold P. Erickson, "English Skills among Technicians in Industry," Technical Education News, XXVIII, No. 1 (January/February, 1969), p. 16.

he must be able to listen to and comprehend instructions.

During the remaining part of his time -- almost half of it -- the technician is involved with technical tasks of reporting as opposed to "communicative tasks," as defined above by Erickson.

Technical reporting is equally divided between written reporting and oral reporting, both of which are composed of description and analysis. In this sense, there are two differences between oral and written reporting: one, preparation and delivery; and two, language, color, and effect used.

In written reporting, the technician has tasks of describing such items as repair of machinery, changes in product specifications, and items for sales brochures. Industries insist on clarity, conciseness, and accuracy of language and spelling. The technician must also accurately report, in the form of test analysis, data he receives from tests.

In oral reporting, the technician must be able to comprehend as well as speak with all levels within industry -- "from the engineer and the administrator to the worker on the line."[10] He will be called upon for short impromptu speeches, as well as for explanations of on-going experimental and developmental projects. He will, therefore, need to effectively illustrate his presentation by means of visual aids and communication.

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[10] _Ibid._, p. 18.

D. Student Characteristics

A. Harvey Belitsky of the W. E. Uphohn Institute for Employment Research related findings of a study[11] concerning private vocational school students in postsecondary education.

> Since students are the major "consumers" at private vocational schools, it has been in the interest of school administrators and instructors to adjust to student differences in age, educational attainment, ability, and health.
>
> Although the average age of the enrolled students is comparatively young, there have been numerous instances of success in training older persons, both the healthy and those ailing physically or emotionally. The study of NATTS (National Association of Trade and Technical Schools) schools disclosed a median age of 20 years for students enrolled in the day sessions; only about 10 percent of the students were 26 or older. The average age of evening students was considerably higher, with nearly two-fifths being 26 or older. Most evening students had been employed full time, and a high percentage of them still found it necessary to work full time during the day while training for a specialty within their occupation, or for a completely different vocation. For both day and evening sessions, the general age range at the NATTS schools during 1965 to 1967 was 17 to 48 years; but some schools even had students who were in their sixties.
>
> Although enrollees in the trade and technical schools are predominantly men, several schools do provide considerable training opportunities for women in such courses as medical and dental assisting, commercial art, and hotel-motel management. The women naturally account for the large majority of students enrolled in business and cosmetology schools.[12]

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[11] A. Harvey Belitsky, Private Vocational Schools and Their Students: Limited Ojbectives, Unlimited Opportunities (Cambridge: Schenkman Publishing Company, Inc., 1969).

[12] ________________, Private Vocational Schools: Their Emerging Role in Postsecondary Education (Kalamazoo, Michigan: The W. E. Uphohn Institute for Employment Research, 1970), pp. 13-14.

Aaron J. Miller, in a speech presented at the American Technical Education Association in Denver, Colorado, December 4, 1966, describes factors present in successful technical institute students. He defines a "successful" student as one who completes his particular program, as opposed to the "unsuccessful" student who drops out before completion of his program. He speaks of intellective factors and non-intellective factors involved in success.

First, intellective factors in the successful technical student include "interest and ability in the application of both mathematics and science to the field of technology in which he finds his interest."[13] Also, the student's basic minimal reading ability is a significant predictor of success in postsecondary vocational programs -- more so than his abilities in mathematics and science.[14]

Second, non-intellective factors include the student's personal characteristics and values. Personal characteristics mentioned are social class background and degree of need for achievement. Social class background is equated with the father's education and occupation, as well as with family income. This factor was found not to be significant in relation to successful completion of a technical program.

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[13]Aaron J. Miller, "Characteristics of the Technical Education Student" (speech presented at the American Technical Education Association in Denver, Colorado, December 4, 1966), p. 6.

[14]Ibid., citing D. W. Brown, "The Relationship of Academic Success of Students Enrolled in the Oklahoma State University Technical Institute of Reading Ability and Mechanical Ability" (unpublished Master's Thesis, Oklahoma State University, 1964).

However, choice of a four year college program, rather than a two year technical institute program, was found to relate more directly to family income or to the parent's ability to pay for two additional years of education. Parents of students in a four year college program express a greater need for achievement, emphasized value of college training, and motivated their children in the direction of a baccalaureate program.[15]

Among personal values of successful students was a lower degree of "nurturance type needs" than found among dropouts:

> ......the successful student was one who was detached from an excessive need for others. He relied primarily on his own interpretations of situations and not on the interpretations of others. He required a certain amount of privacy from others and was, to a larger degree, independent of the feelings of others. This successful student might be described as "things" oriented rather than "people" oriented.
>
> On the other hand, the technical institute dropout was one with an excess of nurturance type needs. That is, he tended to be an excessive conformist who had great difficulty in disagreeing with others. He tended to be dependent on the help of others far in excess of necessity. This technical institute dropout might be described as "people" oriented rather than "things" oriented.[16]

In summary, Miller's five main characteristics of the successful technical institute student are:

1. Average academic ability
2. Average ability in mathematics and science

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[15] Ibid., citying Aaron J. Miller, "A study of Engineering and Technical Institute Freshman Enrollees and Dropouts in Terms of Selected Intellective and Non-Intellective Factors" (unpublished doctoral dissertation, Oklahoma State University, 1966), p. 7.

[16] Ibid., pp. 8-9 .

3. Genuine interest in applying the mathematics and science skills to a particular area of technology
4. Maturity and personal characteristics enabling him to relate to and with others
5. Judgment without excessive reliance upon others

Grant Venn in an Office of Education publication explains that in many locales there is a large population of promising potential technical students who do not have all of the prerequisites for entering technical programs and, therefore, are in need of pretechnical post-secondary programs, as is mentioned in Chapter IV of this paper. These students include:

1. High school graduates who have not studied all of the required subjects.

2. High school graduates with high motivation toward mechanical or scientific activities (ham radio, photography, hot rod automobiles, livestock or animals, etc.) who, because of a consuming interest in such activities, have not concentrated on language, mathematics, or organized science.

3. High school graduates who have spent a large proportion of their time during high school years in out-of-school employment causing their scholastic record to reflect disproportionately low accomplishment when considered in the light of the student's total high school employment and academic load.

4. Those who graduate from high school or those who leave high school near to graduation to enter employment or the armed services. An increasing number of these students want to return for full-time preparation to become technicians but do not have requisite preparation or need to refresh their scholastic skills and knowledge.[17]

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[17]Grant Venn, Pretechnical Post-High School Programs, A Suggested Guide, Technical Education Program Series Number 12, U. S. Office of Education (Washington, D. C.: Government Printing Office, 1967) p. 1.

Therefore, when an educator in postsecondary programs examines student characteristics, he finds differing backgrounds of education and experience, as well as varied educational and personal needs.

II. INSTRUCTIONAL PROGRAMS AND STUDENT SERVICES IN POSTSECONDARY VOCATIONAL-TECHNICAL CURRICULA

Educators designing and developing postsecondary curricula realize the necessity of assuring proficiency of their graduates in the occupation for which they are being trained. Instructional areas needed to train for jobs in vocational-technical areas include instruction in general education and in subject matter closely related to specific skills courses. Educators also acknowledge responsibility for offering student services, such as guidance, counseling, and placement. In the following discussion Section A is concerned with vocational curricula in private vocational schools; Section B discusses general and related instruction in vocational-technical curricula; and Section C deals with student services, such as guidance, counseling and placement, in post-secondary curricula.

A. Instructional Programs in Vocational Curricula

Belitsky, in his findings of a study of five hundred private trade and technical schools, states that these schools respond to the training needs of many industries and professions by offering about two hundred fifty different occupational courses.

The following are the six major vocational categories listed by Belitsky and the number of courses in each category. The total number of courses in these schools in nearly 1.500.

Vocational Category	Number of Courses
Total	851
Auto Maintenance and Related Services	127
Data Processing	185
Drafting	131
Electronics	159
Medical Services	154
Radio-TV	95

Belitsky states that less than sixty percent of all reported courses are included in the above categories. The three largest training areas listed above------------data processing, electronics and medical services-------------are said by most manpower projections to be growth fields. The three remaining categories are not necessarily "traditional" because, as Belitsky states, drafting may be allied with the electronics industry and a radio-TV course may emphasize the repair of color television sets. Even automobile repair offers numerous employment openings for competent workers.

Belitsky mentions other important training fields, including the following courses: commercial arts; construction; fashion design; needle trades; shoemaking; food preparation, processing, retailing and service; interior design and related services; machine shop; major and minor appliance repair and servicing; photography; printing; promotion, sales, and related services; tool and die design; various forms of transportation and traffic management; and welding. Finally, courses in aerospace engineering technology, waste, and wastewater reconversion, gardening, hotel-motel operation. These fields and many others, though listed by only a few schools, are areas of growing job opportunities.

Not all of the courses are equivalent to generally accepted occupational designations. However, occupational breakdowns are necessarily somewhat arbitrary, and personal differences are evident with respect to vocational interest, ability, and willingness to devote the required time to what is regarded as ideal, well-rounded training.

The great variety of occupational training is matched by a wide diversity in course length and, quite expectedly, in tuition.[18]

B. General and Related Instruction in Technical Curricula

Robert C. Bartlett relates the rationale of the North Central Association of Colleges and Secondary Schools regarding the general educational requirement in vocational-technical postsecondary programs. He states that students in these programs "need to develop as intelligent, active and informed citizens, consumers, and members of social groups. Therefore........the broading of a student through educational experiences which cultivate the goals of liberal or general education is a necessary part of education beyond the high school level." Thus, in addition to provision of skill development, vocational programs must give the student "opportunities to develop foundations in such general areas as communications and social awareness" so that he will be better able to cope with future changes in technology.[19]

Maurice R. Graney of the Center for Applied Research in Education, Inc., New York City, quotes surveys of educators in technical

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[18]Belitsky (1970), op. cit., p. 6.

[19]Robert C. Bartlett, "Accreditation as It Relates to Technical-Vocational Programs in Institutions of Higher Learning," The North Central Association Quarterly, Vol. 42 (Spring, 1968), p. 313.

institutes as supporting the position that a definite fraction of curriculum should include non-technical instruction.

> .... it can be said that the non-technical content of engineering technician curriculums presents a major problem to many educators. The majority feel strongly that the limited time devoted to it is inadequate, but that the pressures from all sides combine to keep it restricted.[20]

Graney lists initial emphasis within the non-technical portion of curricula as communication skills, fields of human behavior, industrial economics, and government. He notes that appearance of course work in literature, art, music, language, history and philosophy is rare.

Restriction of general education in curriculum is also explained differently:

> General education courses constitute a relatively small part of the total curriculum. It has been found that students who enter a technical program do so because of the depth of specialization that the instruction provides. Many students who elect this training program will bring to it a background of general study.[21]

Nathaniel D. Smith of Northwestern State College of Louisiana, lists percentages of general education with curricula of institutions

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[20] Maurice R. Graney, The Technical Institute (New York: The Center for Applied Research in Education, Inc., April, 1967), p. 61.

[21] U. S. Office of Education, Civil Technology: Highway and Structural Options. A Suggested Two-Year Post-High School Curriculum (Washington, D. C.: Government Printing Office, 1966), p. 3.

surveyed in a junior college study.[22]

> 20% - 30% of general education in 64% of institutions surveyed
>
> 10% - 20% of general education in 26.5% of institutions surveyed
>
> less than 10% of general education in 9.5% of institutions surveyed

Norman C. Harris, Professor of Technical Education at the University of Michigan, gave the following justification for inclusion of general education in postsecondary curricula in engineering technology in his address presented at a conference in St. Louis, May, 1966:

> ....though we live in a technological society, man himself is not a machine. If higher education holds out hope for the personality and individuality of man, and I think it does, then all educational programs must incorporate some degree of confrontation between students and the ideas men have produced and nurtured through the centuries. Contemplation, I am convinced, is good for everybody -- it should not be an exercise reserved for the elite few. I suppose it would be difficult to prove that a given amount of general education or liberal arts content in the two-year occupational education curriculum can produce any stipulated amount of insight into the problems of man and society, but if we have any faith in democracy...... an experience in general education would seem to be worth the gamble for all junior college students[23]

Harris suggests criteria for a satisfactory program of general education for associate degree curricula in technical schools.

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[22]Nathaniel D. Smith, Status Of and Need for Technical-Institute Programs in the Public Junior College (Natchitoches, La.: Northwestern State College of Louisiana, 1966), p. 9.

[23]Harris (1966), *op. cit.*, p. 49.

General education courses in colleges are those whose objective is to expand the common learnings.... knowledge and attitudes which should be possessed by all persons who have had a college experience of two years' duration.

It should not be necessary......that general education courses......satisfy "transfer" requirements to a four-year college. On the other hand, they must not be re-packaged high school courses.

The following suggestions are intended as a flexible framework within which each institution may experiment to develop the best possible general education core for its students.

1. A full year (two semesters, or three quarters) of English should be expected -- six semester credit hours. The course should be required of all freshmen in Associate-degree curriculums.

2. A full year (six semester credit hours) of social science should be expected. This work could consist of separate courses in political science, economics, history, or content from these disciplines could be synthesized and integrated in a two-semester course.

3. At least one semester of work in the behavioral science or the humanities would be expected.

This requirement could be met by a three-credit course in applied psychology, or ......"Introduction to Western Civilization."[24]

In addition to the above three items, which Harris considers basic to all associate degree curricula, the following "college-level" courses, Harris feels, should be included in those programs where neither the specialized course content nor the supporting theory course content includes significant work in mathematics or science:

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[24]Norman C. Harris, "The Accreditation of Technical Schools--An Analysis of Some Major Issues," The North Central Association Quarterly, Vol. 42 (Spring, 1968), p. 320.

1. A one-semester basic mathematics course--four hours per week.

2. A one-semester introduction to physical science course -- three lecture hours (no laboratory) per week.

C. Student Services in Postsecondary Curriculum: Guidance, Counseling, and Placement

The Office of Education recommends inclusion of guidance and counseling in an instrumentation technology curriculum on postsecondary level. The Office suggests that the students should be helped in making educational and occupational decisions that are consistent with his interests and aptitudes. They further state that technical institutions should examine use of standardized tests to assist students in areas of guidance and in placement.

Counselors should advise a student if revision of his educational objectives is indicated either by his lack of interest in the program, lack of scholastic ability, or interest or potential ability in another program.[25]

Major focuses for counseling are set forth by the Maryland Association of Junior Colleges.

1. Professionally trained personnel are to assist students in understanding themselves and their goals, values, attitudes, and abilities.

2. Counseling should emphasize student decision-making so that students will be able to assume increasing responsibility for their educational and personal decisions.

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[25] U. S. Office of Education, Instrumentation Technology, A Suggested Two-Year Post High School Curriculum. Technical Education Program Series, Number 6 (Washington, D.C.: Government Printing Office, 1966), pp. 5-6.

3. Counselors need to have capabilities of discussing educational, vocational and personal problems and issues with students.

4. Counseling should be directed to all students, not just to those with special problems.

5. Counselors need to work with students who are enrolled in career-oriented programs.

Counselors need to know about the labor force and market, expecially in the local community. They must help the majority of "transfer-oriented" students who do not transfer to accept and adjust to these basic changes in their goals. Time should also be spent with students who withdraw from college by helping them adjust to their new goals and to find appropriate employment and/or other educational opportunities.[26]

Henry Moughamian states, in the final report of The Effects of an Intensified Counseling Program on Sophomore Junior College Students,: "Additional counseling of prospective graduates can increase the graduation rate." He gives the following recommendation, based on results of the study:

1. Counseling services to prospective graduates should be improved. This study emphasized the quantitative aspect and demonstrated the positive effects of a lower student-counselor ratio.

2. Many junior college students do not graduate because of a lack of interest in the A.A. Degree and/or a lack of knowledge of graduation requirements. Community colleges need to increase their efforts in making and keeping students aware of requirements. This practice should begin in the freshman year and continue until graduation.

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[26]Maryland Association of Junior Colleges, The Role of Student Personnel Programs in Maryland Community Colleges (Baltimore, Maryland: Maryland Association of Junior Colleges, April, 1969), p. 17.

> The value of identification of potential graduates and individualized attention can have a lasting value for the careers of students.[27]

In addition to functions of guidance and counseling, postsecondary vocational-technical institutions need to fulfill their role in the placement of their graduates in community businesses, industry, and government. They also need to assess these local resources in terms of manpower needs in order to justify content of curricula. Thus, institutions need a liasion between community resources and themselves -- namely, a placement office.

Milton C. Mohs lists reasons for including a placement director on an institution's curriculum committee by virtue of such a director's information sources, which include:

1. Employers, through discussion of job requirements
2. Advisory committees to business, trade, and technical programs
3. Reports of student-placements about their experiences on the job
4. Studies of graduates and others leaving college regarding employment, job success, and etc.

Mohs includes counseling as a part of placement function:

> Counseling which contributes to the readiness of the applicant for induction into occupational life -- counseling in the techniques of the interview, methods of evaluating growth possibilities of companies,

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[27]Henry Moughamian, The Effects of an Intensified Counseling Program on Sophomore Junior College Students. Final Report. (Chicago, Illinois: Chicago City College, September, 1969), pp. 2-3.

opportunities for promotion, value of the training program and what the employer expects and demands of his employees -- all these and more are part and parcel of placement at this level.[28]

Richard J. Vasek, of Mississippi State University, states recommendations for electronic curricula. These provisions would make electronic curricula more sensitive to present industrial manpower needs. They could also be generalized to other technical curricula.

1. A study should be made to ascertain the feasibility of developing a continuous technical curriculum whereby a student could enter a technical program and progress according to his ability. The type of employment he could demand would depend upon the level of proficiency he obtained upon terminating his formal education.

2. To coordinate this educational approach, a closer working relationship between guidance, industrial and educational personnel is recommended. More emphasis should be placed upon the development and use of curriculum guides designed to implement this diversified approach to technical training.

3. Similar research should be conducted in other regions to ascertain the extent to which post-high school technical programs, through electronic content offerings, are meeting industry's needs.

4. Regional content studies in other technologies such as mechanical, civil, and drafting should be initiated.

5. A follow-up study of electronic technology graduates should be conducted to determine the extent to which the technical curriculum they pursued is meeting their vocational needs.[29]

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[28]Milton C. Mohs, Service Through Placement in the Junior College--The Organization and Operation of a Junior College Placement Bureau (Washington, D. C.: American Association of Junior Colleges, 1962), p.16.

[29]Richard J. Vasek, A Comparative Analysis of Electronic Content in Public Post-High School Technical Institute and Electronics Technology Requirements of Industry (State College, Mississippi: Mississippi State University, June, 1967), pp. 61-62.

III. CURRICULUM DEVELOPMENT: CONTENT AND SEQUENCE

Educators recognize the need for a coordinated effort to develop the proper sequence of courses within the curriculum. Basic to the scope of a vocational-technical curriculum are two factors: 1) a relationship in time among skills courses, related courses, and general education, and 2) within these three areas, a relationship of total time divided between class hours and laboratory hours.

Again, the author finds a need to mention that majority of curricula reviewed was in technical program area. Therefore, the following discussion centers on technical education curricula.

A. Content of the Curriculum

James McGraw, project director of the McGraw Report of 1962, cites three main areas of content in engineering curriculum:

1. Basic science courses, i.e. mathematics and physical science
2. Non-technical courses, i.e. communications, humanistic social studies, management, and human relations
3. Technical courses, i.e. skills and specialities[30]

Examples, such as basic science courses and non-technical courses listed above, are associated with job skill training, and will be termed "related courses" in the following discussion. Those courses which do

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[30]Graney, op. cit., p.63, citing James L. McGraw, Characteristics of Excellence in Engineering Technology Education (Urbana, Illinois: American Society for Engineering Education, 1962), p. 25.

not relate to actual training for job skills and which apply to students in all postsecondary vocational-technical programs will be entitled "general courses", or "general education". Only those courses consisting of the actual job skill training will be designated "skills courses".

Given the above definition of courses, the following list includes subjects representative of related and general courses reviewed:

1. Related Courses

   a. Mathematics and Science
   b. Technical Report Writing, Drawing, Sketching, and Diagramming
   c. Social Science: Business Organizations, Government (in its relation to industry), Industrial Economics, Industrial Organizations and Institutions, Industrial Psychology, Business Management and Human Relations

2. General Courses (General Education)

   a. Communication Skills: English Composition, Grammer, Reporting Writing, and Oral Communication
   b. Study Skills
   c. Social Studies: Government (General), History Economics, Political Science, Psychology and American Institutions
   d. Physical Education
   e. Personal Typing
   f. Public Speaking
   g. Health Education

The relationship among general education courses, related courses, and skill courses is shown in Table I in terms of percentages of total clock hours in the curriculum. Tables II and III break down both related courses and skills courses in terms of percentages of theory and laboratory hours.

TABLE I

POSTSECONDARY CURRICULA:

PERCENTAGES OF COURSE HOURS

Program Areas	Percentages General Education Courses	Related Courses	Skills Courses
Business and Office Education			
business machine and computer industry ED 022 936**	6%	27%	67%
electronic data processing in engineering, science, and business ED 013 325	13%	12%	75%
data processing and programming ED 017 261	11%	25%	64%
data processing ED 023 784	6%	31%	63%
accounting*	0%	46%	54%
marketing management*	0%	23%	77%
secretarial*	0%	63%	37%
Average	6%	33%	61%
Health Education			
medical office assisting*	4%	0%	96%
practical nursing*	4%	0%	96%
dental assisting*	4%	0%	96%
dental hygiene ED 017 707	12%	17%	71%
Average	6%	4%	90%

TABLE I Cont'd.

POSTSECONDARY CURRICULA:

PERCENTAGES OF COURSE HOURS

Program Areas	General Education Courses (Percentages)	Related Courses (Percentages)	Skills Courses (Percentages)
Occupational Home Economics Education			
food service management*	4%	6%	90%
child care development*	0%	2%	98%
Average	2%	4%	94%
Technical Education			
instrumentation ED 012 337	3%	28%	69%
civil ED 012 338	3%	34%	63%
electro-mechanical ED 012 372	7%	20%	73%
electronic ED 013 309	3%	10%	87%
mechanical and drafting and design ED 017 261	9%	28%	63%
architectural and structural drafting and design ED 017 261	12.5%	26%	61.5%
instrumentation ED 017 261	3%	30.5%	66.5%
food processing ED 017 724	3%	37%	60%
police science (Technical Education News, May, 1966, Stuckey)	30%	7%	63%
Average	8%	25%	67%

TABLE I Cont'd.

Program Areas	Percentages: General Education Courses	Related Courses	Skills Courses
Trade and Industrial Education			
architectural drafting*	4%	8%	88%
automobile mechanics*	3%	11%	86%
aircraft mechanics*	2%	2%	96%
barbering*	7%	14%	79%
bricklaying*	4%	8%	88%
cosmetology*	7%	14%	79%
diesel mechanics*	4%	12%	84%
graphic arts science (Technical Education News, May, 1967)	13%	21%	66%
machine shop*	4%	12%	84%
radio and TV servicing*	4%	4%	92%
welding*	0%	4%	96%
Average	4%	11%	85%
Total Average	5%	15%	80%

**ED numbers refer to those identifying numbers of documents in the bibliography.

*Catalog 1969-70, 1970-71, (Atlanta, Georgia: Atlanta Area Technical School)

TABLE II

SKILLS COURSES IN THE CURRICULA:

PERCENTAGES OF THEORY AND LABORATORY HOURS

Program Areas	Percentages Theory	Laboratory
Business and Office Education		
electronic data processing ED 013 325	62%	38%
data processing and programming ED 017 261	56%	44%
data processing ED 023 784	0%	100%
business machine and computer industry ED 022 926	43%	57%
AVERAGE	40%	60%
Health Education		
dental hygiene ED 017 707	34%	66%
Technical Education		
instrumentation ED 012 337	36%	64%
civil ED 012 338	44%	56%
electro-mechanical ED 012 372	40%	60%
electronic ED 013 309	45%	55%
mechanical and drafting and design ED 017 261	32%	68%
architectural and structural drafting and design ED 017 261	44%	56%
instrumentation ED 017 261	44%	56%
food processing ED 017 724	44%	56%
AVERAGE	41%	59%

TABLE II Cont'd.

Program Areas	Percentages	
	Theory	Laboratory
Trade and Industrial Education		
graphic arts science (Technical Education News, May, 1967)	37%	63%
TOTAL AVERAGE	38%	62%

TABLE III

RELATED COURSES IN THE CURRICULA:

PERCENTAGES OF THEORY AND LABORATORY HOURS

Program Areas	Percentages	
	Theory	Laboratory
Business and Office Education		
electronic data processing ED 013 325	100%	0%
data processing and programming ED 017 261	100%	0%
data processing ED 023 784	100%	0%
business machine and computer industry ED 022 926	67%	33%
AVERAGE	92%	8%
Health Education		
dental hygiene ED 017 707	63%	37%
Technical Education		
instrumentation ED 012 337	64%	36%
civil ED 012 338	69%	31%
electromechanical ED 012 372	80%	20%
electronic ED 013 309	73%	27%
mechanical drafting and design ED 017 261	79%	21%
architectural and structural ED 017 261	76%	24%
instrumentation ED 017 261	72%	28%
food processing ED 017 724	60%	40%
AVERAGE	72%	28%

TABLE III Cont'd.

Program Areas	Percentages	
	Theory	Laboratory
Trade and Industrial Education		
graphic arts science (Technical Education News, May, 1967)	100%	0%
TOTAL AVERAGE	82%	18%

Table I represents percentages of the total course hours within the thirty-three postsecondary curricula reviewed. These curricula were analyzed to determine their general education, related, and skills course content as defined on pages 25-26.

Curricula, which were chosen in order to show percentage breakdowns in course content, are listed by the following program areas: Business and Office Education (six curricula), Health Education (two curricula), Technical Education (nine curricula), and Trade and Industrial Education (eleven curricula). Average percentages, as well as total average of all the curricula reviewed, are given for each program area. The following are the separate program area averages in terms of general education courses, related courses, and skills courses respectively.

- Business and Office Education: 6%, 33%, 61%
- Health Education: 6%, 4%, 90%
- Occupational Home Economics Education: 2%, 4%, 94%
- Technical Education: 8%, 25%, 67%
- Trade and Industrial Education: 4%, 11%, 85%

The total average of courses in the postsecondary curricula reviewed is:

- General Education Courses: 5%
- Related Courses: 15%
- Skills Courses: 80%

Table II shows distribution of theory and laboratory hours in skills courses in four program areas: Business and Office Education, Health Education, Technical Education, and Trade and Industrial Education.

A total of fourteen curricula within these areas are included.[31]

Business and Office Education curricula average 40% theory and 60% laboratory hours. The Health Education curricula are 34% theory and 66% laboratory. The Technical Education listings average 41% theory hours and 59% laboratory hours. The Trade and Industrial Education citation is 37% theory and 63% laboratory. The Total Average of hours spent in skills courses of the curricula reviewed is 38% of total hours spent in theory and 62% in laboratory.

Table III demonstrates allotment of theory and laboratory hours in related courses, using the same program areas as in Table II. Business and Office Education curricula average 92% theory and 8% laboratory hours. The Health Education citation shows 63% theory and 37% laboratory. The Technical Education curricula average 72% theory and 28% laboratory hours. The Trade and Industrial Education listing states 100% of time in theory and no hours in laboratory time. The Total Average of related course hours spent in the reviewed curricula is 82% theory and 18% laboratory.

The U. S. Office of Education, in one of its series of two-year postsecondary curriculum guides, explains a special relationship between laboratory instruction and theoretical class time, that should be incorporated within the technical curriculum. The guide states that laboratory time should be used to teach application of principles and

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[31]Of all the curricula reviewed, only fourteen include a breakdown in class time between theory and laboratory hours. Thus, only these fourteen curricula are cited in Tables II and III.

skills and techniques; whereas, "theory" class time can be the focus for teaching conceptual material, such as organized and related ideas and factual information. Theoretical framework needs to be demonstrated and illustrated by visual aids, as well as by making use of texts, references, and outside study.[32]

Dennis E. Roley, Director of Business and Office Education in the State of Washington, suggests that effects of innovation and creativity on teaching methods are to create a greater emphasis on student motivation and morale. This trend is evident in the concept of teaching a total system rather than a specific job, although Roley quickly adds that specific job instruction is a definite part of postsecondary programs. He further states that many institutions assume a need for their students within economics and business organizations, fields of knowledge, as well as in technical skills. This emphasis "reflects the concern for the individual's job entry as well as his advancement throughout his work life." Thus, postsecondary vocational education institutions are responsible for "relevant instructional programs, both general and specific, both academic and vocational."[33]

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[32] U. S. Office of Education, Food Processing Technology: A Suggested Two-Year Post-High School Curriculum (Washington, D. C.: Government Printing Office, 1967), pp. 8-9.

".....two hours of outside study time have been suggested for each hours of scheduled class time."

[33] Dennis E. Roley, "Innovate or Revitalize?" American Vocational Journal, Vol. 44, No. 3 (March, 1969), p. 72.

Another curriculum guide in the Office of Education's Technical Education Program Series lists major demands of functional competence in a broad technological field as being necessary in preparatory technical training.

1. The training should equip the graduate to take an entry job in which he will be productive.

2. It should enable him to advance to positions of increasing responsibility after a reasonable amount of experience.

3. It should provide a foundation broad enough to support further study within the graduate's field of technology.[34]

Also concerned with the design of a technical curriculum is the Washington State Board of Vocational Education. They stress the need to provide "training which is essential to employment" and "education that develops an informed, responsible, participating citizen". The issue involved here is "to determine a proper balance between them. If such is to be achieved in considerable measure, neither can be realized in its entirety."[35]

Clarence E. Peterson, in a curriculum guide for electronic data processing, listed "special requirements for technical curriculums."

1. The curriculum has at least thirty credit hours of specialized technical course work and from fifteen to twenty credit hours of mathematics and science.

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[34] U. S. Office of Education, Civil Technology, op. cit., p. 11.

[35] Washington State Board for Vocational Education, Data Processing: A Suggested Two-Year Post High School Curriculum (Olympia, Washington: Washington State Board for Vocational Education, August, 1963), p. 1.

2. There are no more than five courses which require extensive outside preparation in a single term of the curriculum.

3. Total class and laboratory load is no more than twenty-eight clock hours per week.

4. Specialized course work is introduced in the first term by one or two major courses.

5. Mathematics and science course work are correlated with technical study during the first year of the curriculum.

6. Auxiliary technical courses are included to support and broaden the student's understanding in the technology.

7. Provision is made for individual work during the final phases of the program in the form of problem-solving.[36]

Maurice W. Roney of Oklahoma State University relates general principles in technical curriculum design. Graduates need skills so that they can be "productive employees with a minimum of on-the-job training". Roney lists as methods of accomplishing this goal: (1) making use of "hands-on" equipment in the instructional program whenever possible, (2) emphasizing knowledge and thought processes rather than special techniques or procedures, and (3) including a good foundation of mathematics, science, and communication skills. "Advanced

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[36]Clarence E. Peterson, Electronic Data Processing in Engineering Science and Business Suggested Techniques for Determining Courses of Study in Vocational and Technical Education Programs, U. S. Office of Education (Washington, D. C.: Government Printing Office, 1964), p. 21.

study in any technical field will normally require competence in these three disciplines."[37]

Roney describes an engineering technology curriculum as "a planned sequence of college-level courses, usually leading to an associate degree." He defines "college-level" to show the attitude of "rigor and the degree of achievement demanded, and not solely or even necessarily that the credits are transferable to baccalaureate programs".[38]

In opposition to Roney's stand for college level courses is the opinion of Norman C. Harris concerning course level within engineering programs in junior colleges.

> There is a wide range, or difference in difficulty level, in junior college occupational programs. This range is so great that a junior college which claims to be "open door" will have to provide two or more levels of occupational education programs -- some curriculums at the semiprofessional or technical level, some at the skilled level, and perhaps some at the semi-skilled level . . . .
>
> Many junior colleges commit a grave error as they plan technician curriculums. In their determination to be "academically respectable..." they plan programs only for engineering technicians, pitching them at a level of rigor which differs hardly at all from that of lower division engineering programs.[39]

Additional comments by Harris on this topic have been stated in the Foreword of this paper.

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[37]Maurice W. Roney, Electromechanical Technology (Stillwater, Oklahoma: Oklahoma State University, September, 1966), p. 3.

[38]*Ibid.*, p. B-3.

[39]Harris (1966), *op. cit.*, pp. 50-51.

B. Sequence of Curriculum

The second consideration in curriculum development is the sequence that courses are to follow. Several studies dealing with technical training refer to key issues in curriculum sequence. (Roney, 1966; U. S. Office of Education, Civil Technology, op. cit.; U. S. Office of Education Food Processing Technology, op. cit.). Correlation of subject matter into a sequence of courses is in contrast with professional curriculum design, as the latter includes basic and unrelated courses in the first term which leads to specialization in later terms.

> In technical curriculums it is mandatory that specialized technical course work be introduced in the first term. Deferring this introduction for even one term imposes serious limitations on the effectiveness of the total curriculum. Several important advantages accrue from the early introduction of......the technical specialty: (1) student interest is caught by practical aspects (because if the first term consists entirely of general subjects -- mathematics, English, social studies -- students often lost interest); (2) by introducing technical study in the first term it is possible to obtain greater depth of understanding in specialized subjects in the later stages of the two-year program; and (3) practice is gained in the application of mathematics in the technical courses. The student's study in mathematics is reinforced by his application of the disciplinary values obtained therefrom and the need for these values in technical study.[40]

The following is a rationale for inclusion of courses at a given place in curriculum:

Course work in the first year is designed to:

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[40] U. S. Office of Education, Civil Technology, op. cit., pp.11-12.

1. Develop a scientific background necessary for the successful completion of future courses and to allow for a more thorough practical application of technology to a highly scientifically oriented field.

2. Introduce the major field of study to motivate the student and maintain his interest.

3. Establish a means of verbal, graphic, and written communications.

4. Conduct laboratory exercises to develop scientific techniques and to provide greater interest, continuity, and assimilation of class work.

Courses in the second year are arranged to:

1. Broaden the student's conception and perception of the society in which he lives by including courses in the social sciences.

2. Provide maximum instruction in specialized courses to obtain the technical competency expected of the student.[41]

Coordinating mathematics, science, and technical courses is important since technical subjects deal with application of scientific principles. This parallel scheduling of mathematics and science concepts with technical courses contrasts sharply with practice in higher education in which mathematics and science skills precede technical study.[42, 43]

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[41]U. S. Office of Education, Food Processing Technology, op. cit., pp. 13-14.

[42]Roney, op. cit., p. 4

[43]For a twenty-one page discussion of the technical curriculum see· Criteria for Technical Education. A Suggested Guide OE-80056, Office of Education (Washington, D. C.: November, 1968). Available from Superintendent of Documents, Washington, D. C., 20402 for $0.45 (Catalog Number FS 5.280:80056).

IV PRETECHNICAL AND REMEDIAL PROGRAMS

The Maryland Association of Junior Colleges states suggestions for student personnel in the area of remedial and developmental programs in community colleges. A few of these suggestions are to (1) establish procedures to identify students for referral, including faculty referral and diagnostic testing, (2) develop activities and materials in the area of study skill, and (3) consider students enrolled in developmental programs as college students and totally integrated into the college.[44]

Following is an explanation of two pretechnical programs to be used in postsecondary technical schools.

First, Angelo C. Gillie, Ed. D., of Pennsylvania State University proposes a pilot program for post-high school youth who are in relatively low academic standing in secondary general curricula.

> This program actively seeks to reduce or overcome negative attitude toward work, ... brings relevant, broad exposures to technician-type experiences which can serve as launching points into more specialized programs. It is also felt that the exposure of the student to <u>several</u> technical subject areas, rather than the traditional focus on <u>single</u> specialty area, can serve to better prepare him for the general functions of the technician.[45]

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[44] Maryland Association of Junior Colleges, <u>op. cit.</u>, p. 24.

[45] Angelo C. Gillie, "A General Technician Program for School Alienated Youth", <u>Technical Education News</u>, Vol. 28, No. 2 (May/June, 1969), p. 6.

This program seeks to give the student a broad range of relevant technical experience, which will serve as a foundation for specializtion. These experiences are arranged in the following General Technician curriculum outline, including credit hours:

General Technician Curriculum Outline

1. Machine shop practice 3
2. Selected Topics 12
   (Electricity, Electronics, Instrumentation, Physics, Cryogenics, Chemistry, and Vacuum Technology)
3. Selected topics in Math 9
4. General Education 24
5. Work Practicum 12
   (15 work hours per week, paid by employer at the prevailing rate)

Gillie indicates that classes must be at a low academic level. Also, both occupationally oriented activities, as well as basic education, should be relevant. General education must depend upon oral communication with little reliance on reading and writing abilities. Thus, general education would be "a sequence of interdisciplinary studies" that would "deal with those aspects of communication, humanities, social science, and the arts that most immediately tie in with their present lives and problems."[46]

Second, Grant Venn, in a curriculum guide sponsored by the Office of Education, offers pretechnical postsecondary school programs. Following is an example of a program to "provide students opportunity to master the subject matter and related laboratory or other skills........ equivalent to above average high school completion."[47]

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[46] Ibid., p. 7.

 [47] Venn, op. cit., p. 13.

SUBJECT	HOURS/WEEK	
First Semester	Class	Laboratory
Introduction to Technical Specialty (Technology of Student's Choice)	2	3
Study Skills	2	2
Preparatory Communication Skills I	3	0
Preparatory Physics I or Preparatory Chemistry I	4	4
Preparatory Mathematics I	4	0
Total	15	9
Second Semester		
Preparatory Communication Skills II	3	0
Preparatory Mathematics II	4	0
Preparatory Physics II or Preparatory Chemistry II	4	4
Preparatory Biological Science (Optional for Biological Science Technologies)	3	4
Total	14	8

The Maryland Association of Junior Colleges states that developmental or clinical approaches to reading developmental and study skills are closely related to counseling and should, therefore, come under student personnel. However, those reading courses organized for credit should be offered through an academic department. The Association suggests that community colleges are responsible for "remedial and developmental programs in English composition, mathematics, and other subject matter areas." Thus, there should be a coordinated effort between the "academic area" and the student personnel area for this responsibility.

SUMMARY

Those who deal with postsecondary vocational-technical programs must take into consideration many facets of curriculum design and development. First, regional manpower needs must be identified in order to define types of training programs to be offered. Once these programs are specified, a study of job skill requirements as determined by job analysis must be conducted. Only then can relevant curricula be designed.

Attention must also be given to basic skills and general abilities required of the individual in the occupation for which he is being trained. In conjunction with this concern are these factors: (1) the relative amounts of time alloted to skills course, related courses and general education, and (2) the relationship in these areas between time spent in class and in the laboratory. As shown by Table I, an average of five percent (5%) of postsecondary curricula reviewed is composed of general education components, and an average of fifteen percent (15%) of the curricula is made up of courses related to job skills. Thus, general and related instruction must necessarily be included, along with proper skills instruction, in postsecondary curricula. The inclusion of these instructional areas, outside of training for skills, is a must for technician training.

When studying student characteristics, one will discover differing backgrounds of training and experience, as well as different personal needs. Postsecondary education can meet these needs in part by establishing student services, i.e. guidance, counseling and job placement services, within the educational setting. In addition, the level of proficiency needed by students to function in vocational-technical curricula may be developed through operating pretechnical and remedial programs, i.e. the basic education element in postsecondary education.

The problem stated in the Foreword concerning the appropriate composition of postsecondary vocational-technical curriculum can be restated as follows. Currently, postsecondary curricula is concentrated at two extremes. One, the two year terminal programs with rigorous curricula approximate that of the first two year of baccalaureate curricula. The other extreme is the specific training for job skills, i.e. short term program, which do not assume responsibility for general education components or for training related to job skills being taught. A working compromise to this problem in curriculum development is needed now. It must be based on student needs, as well as on employment needs.

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*For explanation of all footnotes, see page 52.

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