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ABSTRACT

Basic concepts, definitions, and philosophical positions concerning cooperative vocational education were identified to form a theoretical model for program development. The review crosses the boundaries of the occupational fields within vocational-technical education, and attempts to focus more narrowly on a specific instructional methodology "Dissertation Abstracts," professional journals, and a computer search of the ERIC collection were reviewed to identify 279 research studies with publication dates from 1934-1969. Major topics are: (1) The Student Learner, (2) The Employment Community, (3) Educational Technology, (4) Program Implementation, and (5) Priorities, Problems, and Issues. Some research gaps include: (1) a theoretical and philosophical framework for research and development in vocational and technical education, (2) interpretative dissemination systems for manpower data, (3) research technology to provide for transformation of occupational analysis data into instructional objectives, and (4) communication of research and development products by practitioners in vocational-technical education. (SB)

Research

Series No. 60

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review and synthesis

of research on

Cooperative Vocational Education

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Research Series No. 60
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REVIEW AND SYNTHESIS OF RESEARCH ON COOPERATIVE VOCATIONAL EDUCATION

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PREFACE

This *Review and Synthesis of Research on Cooperative Vocational Education* is one of a series of "state of the art" papers in vocational and technical education and related fields. It should assist in identifying substantive problems and methodological approaches for researchers and curriculum development specialists, as well as providing practitioners with a summary of research findings which have application to educational programs. In the field of vocational and technical education, the pace of research and development activities has increased considerably during the period under review. Gaps which exist for some readers are probably the result of the author's prerogative to be selective.

As one of a series of information analysis papers released by the ERIC Clearinghouse on Vocational and Technical Education, this review is intended to provide researchers, curriculum development specialists, and practitioners with an authoritative analysis of the literature in the field. Those who wish to examine primary sources of information should utilize the bibliography. Where ERIC Document numbers and ERIC Document Reproduction Service prices are cited, the documents are available in microfiche and hard copy forms.

The profession is indebted to Harold R. Wallace for his scholarship in the preparation of this report. Recognition is also due Max Eddy, Professor and Head, Department of Industrial Education, Purdue University, and Mary Klaurens, Professor of Distributive Education, University of Minnesota, for their critical review of the manuscript prior to its final revision and publication. Joel Magisos, information specialist at The Center, coordinated the publication's development.

Members of the profession are invited to offer suggestions for the improvement of the review and synthesis series and to suggest specific topics or problems for future reviews.

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INTRODUCTION

It is almost axiomatic that blending practical experience with formal instruction enhances the educational significance of both. This blending can take many forms. It occurs under a variety of synonyms, in a variety of mutations. It is employed by schools, by industry, by public service institutions, by professional associations and unions. Current critics of education are insisting that instruction should be relevant, and some formula for combining work and education is an ever popular recommendation.

Within some of the established vocational-technical disciplines we find work-related education in highly structured administrative patterns, with well-developed methodologies, accepted basic concepts and definitions. These cooperative education programs, apprenticeship training programs, and supervised agricultural experience programs have been established, shaped and supported through legislative action for several decades. Recent legislation has intensified the demand for work-related occupational education, with a new emphasis on extending the programs beyond traditional boundaries. The call is to serve new and different clientele, and innovation is the keynote.

In decades past, the intuition and judgment of leaders in education and the world of work have formed the theoretical and philosophical base for occupational education program development. In 1966, a series of research reviews was produced. Each review was oriented to a specific field of vocational-technical education as an assessment of the state of the art in research for the researchers and practitioners in that field (Warmbrod, Tuckman, Streichler, Meyer, Lanham, Chadderon, I.).

In each case the search and review procedure produced very little or no research oriented to the methodology of work-related education. Warmbrod's comment is typical (1966, I.).

> Programs of supervised experience in agricultural education have been justified philosophically and educationally on the grounds that supervised practice motivates the learner, allows classroom instruction to be taught in a meaningful context, provides an opportunity for the application of what is taught, enables the student to learn by doing, and contributes to the development of general skills and attitudes toward work which are needed in any occupation. Strangely enough, research growing out of these theoretical foundations and research designed to test these hypotheses concerning the values of supervised experience in agriculture have been meager. . . Research pertaining to the supervised aspect of agriculture has been almost entirely descriptive in nature.

Recognizing the emerging need for a state of the art report concerning cooperative vocational education and the apparent void in current research reviews, the staff of The Center for Vocational and Technical Education are directing some of their resources and energy toward filling this void. This paper is one aspect of that effort.

As a state of the art report, this review departs from the usual pattern in two respects. First, there has been an attempt to take a much broader view, crossing the boundaries of the occupational fields within vocational-technical education and extending the search to wherever pertinent research could be found.

The second departure is an attempt to focus more narrowly upon a specific instructional methodology. This delimitation, in theory, should result in an intensive and thorough appraisal of a cohesive body of research, reported in the perspective of a definitive theoretical framework. For practical reasons this ideal concept has not been maintained. Most obvious is the problem of identifying a cohesive body of research when the research has been conducted in a variety of different disciplines by researchers who are working independently of each other, having no system for communicating and cooperating with researchers outside their own fields of study. A related problem is the absence of a well-articulated theoretical and philosophical structure which transcends the traditional boundaries of vocational-technical education.

As a compromise with the ideal, a statement of basic concepts, definitions, and philosophical positions has been developed as the theoretical framework for this research review.

The result of this departure from the usual review and synthesis pattern is a document which does not actually provide a thorough, comprehensive review within a definitive discipline. It is presented as a state of the art report, to aid the reader in updating his perspectives on research which has implications for cooperative vocational education.

The most productive source of research reports was the ERIC Clearinghouse and the library of The Center for Vocational and Technical Education. A computer-generated bibliography based on a search of the ERIC collection was very helpful. Other important sources were *Dissertation Abstracts*, professional journals, especially the *Review of Educational Research*, and selected bibliographic documents.

The bibliography for this paper is arranged with the references in groups which correspond to the general outline of the text: The objective of this arrangement, as opposed to the usual alphabetical listing, is to provide the reader with a series of shorter bibliographies on the various research topics. Therefore, bibliographic entries contain an added item, the topic identification reference. For example, reference to Jacobsen (1966, 3.a.) indicates that the item is listed in section 3.a. of the bibliography.

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REVIEW AND SYNTHESIS OF RESEARCH

ON COOPERATIVE VOCATIONAL EDUCATION

I

BASIC CONCEPTS

Terminology

One painful reality of attempting to address this to the vocational-technical education community is the very sticky problem of using terminology which communicates and which at the same time avoids misuse and abuse of terms which have very special and specific meanings within certain disciplines. To illustrate the problem, it was found that the term "occupational education" has at least two very divergent meanings in certain segments of the educational community. In one instance, the term was selected to identify programs in a two-year college in an effort to avoid *negative* connotations evoked by use of "vocational" as a descriptive term. In the second case, "occupational" education was chosen in preference to "vocational" education to identify programs for providing part-time work and remedial instruction for prospective high school dropouts in an effort to retain and protect the *positive* connotations of "vocational" education. Other less dramatic examples are terms such as "cooperative" vs. "work-study," "related classes" vs. "related instruction," "off-farm agriculture" vs. "agri-business," agricultural education "projects" vs. distributive education "projects," "business education" vs. "office education," and the perennial "education" vs. "training."

"Work-related occupational education" is a term which appears to be growing in popular use to designate the broad spectrum of program types where work and education are intertwined. "Coupled" is also gaining acceptance as being descriptive of the broad spectrum of cooperative effort among interested participants in career preparation. However, the terminology of the 1963 Vocational Education Act and the 1968 Amendments is "cooperative work-study education." Clearly, the intent of the authors of this legislation was to use the term as a designation for a broad variety of program types.

Some leading vocational educators and key people in the U.S. Office of Education have taken the position that the term "cooperative vocational education" is more desirable in identifying the type of program under discussion. They feel that "work-study" may be confused with the program which has a primary purpose of financial assistance—in both vocational education and higher education legislation. Another item of evidence showing acceptance of cooperative education as having a very broad meaning is a fragment of a speech by Dr. John A. Sessions, Education Specialist of the AFL-CIO (University of Minnesota, 1969, 6.c.), where he said ". . .in fact the whole apprenticeship system is a form of cooperative education."

Therefore, "Cooperative Vocational Education" was selected as a title for this paper. Other terminology is used with the intent to communicate to the broad audience and with the hope that inappropriate use of specific terms having distinctive meanings will not cause great distress.

Parameters

The above paragraph might convey the impression that cooperative vocational education has no unique distinguishing characteristics. There are, however, several features which most educators would acknowledge as essential elements of this methodology. Perhaps the most important of these is the notion that the student must be actually involved in a productive employment situation. Also, the employment activities must be viewed as having educational significance. To bring about these two conditions it is essential that a partnership and a division of responsibility exist. One of the partners sponsors the educational component of the program and the other sponsors the productive employment component. Both partners are actively and knowingly committed to contribute to the educational development of the student.

The following illustrations will help to clarify the concept of partnership as an essential element in a cooperative vocational program. If a junior college accounting department requires students to secure summer employment in accounting occupations, but employers do not actively cooperate with the college, there is no partnership and no commitment by a partner from the employment community. This is not to imply that the students would not benefit educationally or that the program would not be effective. But by definition, it would not be a cooperative vocational program.

Another near-borderline case is that of an industrial concern which requires and pays for formal education courses for its employees. Unless the educational institution is directly involved in sharing responsibility and commitment to the program with the sponsoring employer, there is no partnership.

A third case which does not meet the criteria suggested here is the situation where the employment is primarily viewed as a wage-earning activity or as a means of keeping potential drop-outs in school on a part-time basis. This type of program is typically called "work-study" or "work experience" but the employment activities are not coordinated with school learnings and there is no partnership and commitment to the education of the student on the part of the employer.

Typically one partner takes the initiative and major responsibility for the program. In some cases, the subject is a student who receives part-time on-the-job training which is related to his school program. In other cases, the part-time work is supplemented with related instruction in school. The students "belong" to the school in the first case and to the business concern in the second. At times a third partner may be involved, particularly when the determination of the program content is not within the domain of the school or the employer. Health and public service occupations offer many

examples of third-partner involvement because trade or professional associations in these fields often have statutory responsibility for certification licensing and for assuring that program graduates are effectively trained.

There are a number of other elements which are sometimes viewed as essential in cooperative vocational education. Some examples are the notion that student-workers must be paid, the requirement of an advisory committee, and the assumption that there will be a training plan for each student. Certainly all these and other such specifications are essential in certain instances and within certain vocational-technical education fields. However, outside these fields program designs and established patterns are found which do not conform to all these specifications, but which are within the scope of this research review.

The preceding paragraphs have shown some of the parameters used in determining the scope and directions of the search and review. What follows is a somewhat more idealistic view of what cooperative work-study education is or should be. It represents what leading educators might accept as a theoretical and philosophical framework for research in cooperative work-study education.

Clientele

Since cooperative work-study education has been defined above as an instructional method, it follows that the clientele would be students or workers in any educational or employment setting where the method might be effectively used. However, the scope of this research review would be severely restricted if traditional concepts of the clientele of cooperative education were maintained. The concepts recommended by the National Advisory Council on Vocational Education are used to define and justify the broadened scope of this review. To quote from page 12 of the document (Committee on Labor and Public Welfare, 1968, 1.):

> Of all the Panel's recommendations, two conceptual changes were most important. The first was the concept that vocational education must be redirected from training in a few selected occupational categories to preparing all groups of the community for their place in the world of work, regardless of occupation. Secondly, the Panel insisted that vocational education must become responsive to the urgent needs of persons with special difficulties preventing them from succeeding in a regular vocational program.

Therefore, the scope of this review does not exclude the college-bound student, the handicapped or disadvantaged student, the adult or four-year college student. It does not exclude health occupations, public service occupations, or other occupational fields which have not by tradition been included in the vocational-technical educational community.

Finally, no occupational level should be excluded. Cooperative vocational education methodology might be found useful for training from the lowest level in the occupational status hierachy, through the full spectrum

of careers to the education of high status professionals. However, the Advisory Council expressed primary concern for vocational-technical occupations. Programs which require more than a two-year college level of preparation often employ internships and other forms of work-related education, but the scope of the search for this review did not extend to sources where research concerned with high level professional training might be found. Therefore, this presentation is addressed to the community of educators and researchers who are primarily concerned with programs requiring less than four years of college education.

Objectives

Cooperative vocational education should be viewed as a means of achieving goals and objectives which might well be achieved by other methods, and no particular set of objectives should be strictly identified with a particular methodology. However, there are certain broad goals of vocational education toward which cooperative education is usually oriented, and these should be identified here. Also, from outside the vocational-technical education community, goals are literally being thrust upon us. The 1963 Vocational Education Act and the 1968 Amendments are formulated as statements of objectives or tasks to which legislators feel vocational educators should direct their efforts.

To quote again from the Advisory Council Report (1.):

> The objective of vocational education should be the development of the individual, not the needs of the labor market. . . Preparation for employment should be flexible and capable of adapting the system to the individual's need rather than the reverse.

It is assumed as a basic concept in this review, that the clientele of vocational education should include *both* students and the employment community in which they live and work. However, there appears to be a distinct shifting of priorities. The following statement by Henry Borow (University of Minnesota, 1969, 6.c.) represents this view:

> Vocational educators more than other teachers must remain constantly alert to the distinction between considerations of manpower utilization and those of individual development. While an industrial democracy constantly strives to maintain a delicate balance between the two values, it is to the latter, the fostering of individual development through training and guided work experience, that the vocational educator owes his chief allegiance.

Another case of dramatically shifting emphasis, and one which deserves more attention than the nature and scope of this paper can permit, is the growing concern about general or liberal education. Three of the several facets of this issue are germane to the development of a theoretical and philosophical framework for cooperative vocational education.

First, with respect to the value of general education as vocational education, it is assumed that courses or programs of study are not by definition

"general" or "vocational" without reference to the individual student, and that many courses and programs, some of which may be offered in elementary grades, may be essential for vocational development.

A second facet of the general education issue is not so easily summed up. Simply stated, it is the reverse of the first. That is, vocational educators should expand their perspective to include a concern for some aspects of the liberal or general education of its clientele. Grant Venn put it this way (1964, 1.):

> What is called for is more and better occupational education, to be sure, but occupational education on a more general basis—teaching certain basic skills of course, but also devoting more time to the development of broader technical understanding of communication and computational abilities, and of an appreciation of civic, cultural, and leisure activities.

Here it is not suggested that vocational educators should assume the role of providing the general or liberal education as such. The point is that there is much in the domain of traditional general education which is essential for vocational competence in today's world of work.

The third issue is the nature and scope of the concern which vocational educators should have for contributing to the general or liberal education of all students. It is well established and accepted that general education programs in industrial arts, home economics, and business can fulfill a liberal education role. But in addition, there is an important role for cooperative vocational education programs in providing the socializing and self-actualizing opportunities needed by all youth in every career field. The following statement by Borow (6.c.) illustrates this concept.

> Broadly speaking, three goals of vocational education are pursued in the work-experience aspect of cooperative education programs. First, the student learns the characteristic skills, duties, and practical understandings associated with the occupation. These are cognitive learnings. Second, he acquires what we may call a work ethos, a set of attitudes, rules of etiquette, and interpersonal skills involving relations with fellow workers, supervisors, and clients. The third objective is to build his self-identity as worker-to-be and to help him to know better what manner of person he is—what strengths, limitations, aspirations, and personal values characterize him. If the student is the beneficiary of wise and sensitive supervision, he will learn to see himself psychologically mirrored in the work situation.

A fundamental concept in the development of this review is the assumption that all students hould have educational experiences which will enhance their development in all three areas described above. Also, by implication, another concept is suggested. It is that cooperative vocational education might serve a general or liberal education function in the sense of providing a complex of experiences which will prepare the student for occupational flexibility and mobility and assist him in maturing socially and psychologically.

These few assertions concerning the basic concepts of vocational education have been identified here because they appear to be pertinent to this research review. They are not in any sense intended as a full and comprehensive treatment of the theoretical and philosophical framework for research and development in vocational-technical education.

Educational Program Development Model

As illustrated in Figure 1, the process of developing and maintaining an educational program may be visualized as having three distinct phases. First is the investigation to gather or produce appropriate information. Consistent with the objectives described earlier, the investigation should be oriented toward the demands to be made upon the student-learners, and to the manpower needs of the community in which the student clientele will live and work. Other relevant information concerning educational resources, technology, etc., is also considered.

Next comes the planning phase where the accumulated information is synthesized, interpreted, and translated into specific objectives. The objectives become the targets for creative problem-solving to develop the strategy, specific tactics and plans to be employed in working toward the achievement of the objectives.

Implementation of the plan is the third phase of activity. Acquiring resources, organizing, developing, maintaining, and controlling the teaching-learning enterprise are the major tasks.

After the teaching-learning enterprise has been in operation long enough to stabilize and become productive, evaluation should occur. Evaluative information is used in adjusting, improving, and possibly redesigning the enterprise.

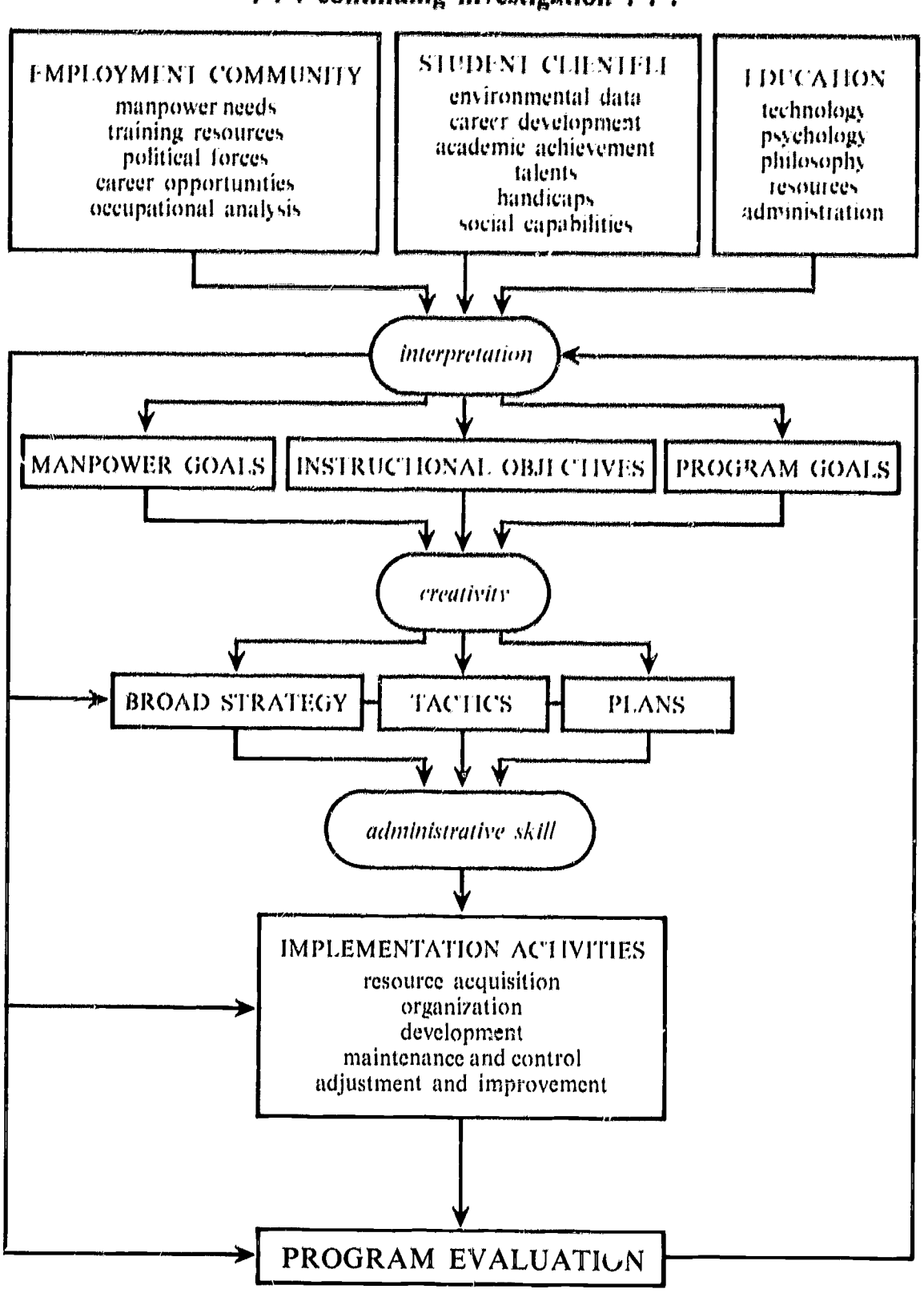
In theory, the investigation is the initial program development activity. In the real world, the usual task is to remodel an existing teaching-learning system. Therefore, program evaluation may be the initial step in the actual procedure. Evaluation should be viewed as an essential aspect of the continuing investigation. Also, even after a major redevelopment has occurred, it is still important to remain abreast of trends and developments that might provide useful input data for planning and implementation of the program. The investigative process should recycle continuously. Up-to-date information should be utilized in reformulation of objectives, strategies and tactics, and administrative practice.

Figure 1 shows the theoretical design which is used as the framework for this review of research. Accordingly, chapters are devoted to research concerning the major components of this theoretical system. Only selected items are reviewed, the purpose being to describe or illustrate exemplary research projects in each broad area.

More thorough consideration and more comprehensive review and discussion are devoted to research with direct implications for cooperative vocational education. In the model shown in Figure 1 the block captioned

Figure 1

OCCUPATIONAL PROGRAM DEVELOPMENT MODEL



"broad strategy, tactics and plans" represents the place in the system where it is assumed that some form of cooperative vocational education would appear.

To more fully identify the important elements of a cooperative vocational education program, and to provide a framework and theoretical perspective for developing a state of the art report, the following list of tasks is presented. Ideally, and in theory, each of these tasks must be performed effectively if the cooperative program is to develop and function properly. The tasks are to:

1. Develop a system for recruiting selecting, training, and constantly upgrading the performance of effective teacher-coordinators.
2. Develop a system for providing and maintaining the facilities and resources required for effective operation of the program.
3. Develop and maintain an effective advisory committee.
4. Develop and maintain an effective public relations program.
5. Provide for recruiting and selection of students.
6. Develop a program of vocational guidance including appropriate placement services and activities.
7. Develop a system for integrating the cooperative program with the education and training preceding and following it.
8. Develop a system to provide appropriate personal counseling, remedial or advanced instruction, or other special services as required by individual students.
9. Provide for effective selection and development of training sponsors and training stations.
10. Provide for the development and utilization of appropriate on-the-job training plans for each student.
11. Develop and maintain a program for utilizing the educational resources of the community to supplement and enrich the institutional program.
12. Provide for appropriate co-curricular activities including student organizations patterned after the professional and trade associations in the occupational areas served by the program.
13. Develop and maintain an effective program of related instruction which is geared to the needs of youth in their first contact with real employment and the world of work and effectively articulated with specific technical instruction and with the on-the-job training component of the program.
14. Develop a system for assessing and evaluating student performance, and for utilizing this information in appropriate program revision, vocational and personal guidance, training plan revision, etc.
15. Develop and maintain a continuous program evaluation system including appropriate communication and implementation activities directed toward constant upgrading of the effectiveness and efficiency of the program.

II

RESEARCH FOCUS: THE STUDENT LEARNER

Emerging Theoretical Concepts

A well-established tradition in the development of cooperative vocational education programs is to begin with a community survey. In theory, the task is to ascertain the demand for workers in a pre-determined occupational field and possibly to locate potential training stations. With this accomplished, the students are selected on the basis of their interest and aptitude for success in the selected career fields. The primary role of vocational guidance in this system is to assist with the selection process. It is assumed that the school student body provides a pool from which the appropriate number of students is drawn, and that students should meet certain specifications regarding their willingness, ability, and readiness for the program. When guidance personnel select students who are not ready, able, and willing, the program may be viewed as a "dumping ground."

The emerging concept of curriculum development in cooperative vocational education reflects a somewhat different perception of the roles of the community survey and vocational guidance. The community survey remains as an important aspect of the developmental process, but it is no longer first on the agenda. First is an investigation to provide information about the student clientele. A key concept in this revised theoretical pattern is the *identification* rather than the *selection* of students. The roles of guidance personnel are expanded to include the educational function of helping students in their career development—a process which extends backward into the students' early school years and ahead to the series of educational and occupational experiences which form the rungs on a career ladder.

There appears to be a growing trend which departs from the pattern described in the first paragraph. The emerging theoretical pattern includes a new element, the investigation to gather important information about the student clientele. The traditional community survey is seen in a new perspective, with less emphasis on providing for the unmet manpower demands of the community and with intensified interest in how the resources of business and industry can be utilized in serving the employment and educational needs of the students—students who are identified *before* the community survey is accomplished.

This chapter includes a review of selected items of research concerned with the broad task of becoming acquainted with prospective student-learners in vocational-technical education. The focus is on research which might be used as input data for curriculum development and implementation in cooperative vocational education.

The typical research project is designed to produce a specific set of descriptive data for a particular type of student. The variety of these studies

is shown in Table 1, which is a list of the studies reviewed. A comprehensive search would produce hundreds more, and a complete taxonomy of research of this type would, in theory, comprehend the full spectrum of descriptive data on one dimension and a complete assortment of potential student types on the other. By browsing over the information in Table 1, the reader will be better able to visualize what this complete theoretical matrix might look like.

After attempting to sort and classify the studies presented in Table 1, two things became obvious. One is that the great majority of studies are concerned with how the student *feels* about something his values, aspirations, perceptions, concerns, and the like. Usually the study attempts to measure or assess the feelings directly through some form of questionnaire or interview procedure. In some cases less direct techniques are used, with inferences drawn from biographical data, environmental conditions, or other factors which are postulated as affecting the students career development or performance in some significant way.

TABLE 1

STUDIES CONCERNED WITH STUDENT CHARACTERISTICS

Characteristics studied	Types of students under study	Reference
Work values as related to: academic achievement job performance personal adjustment	Disadvantaged twelfth grade boys those on cooperative programs vs. those not on such programs	Bernstein 1968, 2.b.
Educational development (using Iowa Tests)	High school diversified co-operative students	Bledsoe 1968, 2.a.
Occupational status	Young adult deaf	Boatner 1964, 2.a. Kronenberg 1966, 2.a.
Factors in decisions to refuse MDTA training	Unemployed adults	Brazziel 1964, 2.b.
Personality (as measured by the Edwards Personal Preference Schedule)	College freshmen: high G.P.A. vs. low G.P.A. vs. drop-outs; male vs. female; co-op. vs. non-co-op.	Briggs 1966, 2.a.
Attitudes toward: the training program recent work experience Career aspirations	Electricians in California	Bushnell 1963, 2.a.

TABLE 1—Continued

Characteristics studied	Types of students under study	Reference
Concerns and expectations regarding involvement in cooperative education	Students, employers, parents participating in programs	Cushman 1967, 2.a.
Biographic and socioeconomic information	Job Corps trainees	Edgerton 1967, 2.a.
Vocational satisfaction, vocational needs	Employed adults	Golden 1968, 2.b.
Vocational realism	Educable mentally retarded adolescents	Gorelick 1966, 2.b.
Self-concepts of ability	Delinquent and non-delinquent boys	Haarer 1967, 2.b.
Self-concepts of academic ability	Caucasian male high school students and drop-outs	Harding 1966, 2.b.
Personal adjustment: in school post school Vocational success	High school mentally handicapped graduates and drop-outs	Harper 1968, 2.a.
Work attitudes, self image, social-psychological background	Work-seeking Negro youth	Herman 1967, 2.a.
Occupational problems	Iowa high school drop-outs	Howe 1966, 2.a.
Vocational outlook	Educable mentally handicapped youth	Jones 1966, 2.b.
Occupational and educational plans as related to work experiences	High school vocational agriculture students	Judge 1963, 2.b.
Self-concept related to occupational requirements, job satisfactions	Male high school students	Kaufman 1967, 2.a.
Occupational aspirations	Negro youth	Keig 1969, 2.b.

TABLE 1—Continued

Characteristics studied	Types of students under study	Reference
Job satisfaction as related to: occupational experience perceptions of job performance, attitudes toward career, interpersonal relations, emotional adjustment, career plans	High school distributive education students	Klaurens 1967, 2.b.
Biographical data: education, age, leisure activities, etc.	Working class males (adult education clientele)	London 1963, 2.a.
Academic status: H.S. rank, G.P.A., Mental Maturity Scores, drop-out rates	High school distributive education students	Mills 1963, 2.a.
Biographical data, career interests, personal and educational characteristics	Apprentices in Nebraska related classes	Parrish 1964, 2.a.
Educational aspirations, expectations and abilities	Rural male high school students and drop-outs	Schill 1968, 2.b.
Home environment factors	Employed adult males	Scruggs 1966, 2.a.
Personal values	Vocational agriculture students	Thompson 1964, 2.b.
Socioeconomic status, employment, etc.	Various ethnic groups	U.S. Dept. of Labor 1969, 3.a.
Self-concepts of vocational ability, socioeconomic status, occupational interests, aspirations and expectations	Individuals two years out of high school, all white	Wamhoff 1969, 2.b.

Second, it is obvious that much of the research is generated and conducted in comparative isolation, without reference to a larger theoretical framework. In only a few instances do we find an integrated and articulated series of studies with a common theoretical focus. However, the trend

appears to be in the direction of more sophisticated theory building and toward concerted research efforts by educational psychologists and vocational educators.

The professional literature of the educational psychologists concerned with vocational guidance is a productive source of research about the student clientele of vocational-technical education. In his review of research on career development Tennyson (1968, 1.) says that "psychologists are beginning to champion sound conceptual models of vocational behavior and are evidencing a lively interest and involvement in putting theoretical propositions to test." For the reader who is interested in a more comprehensive study and review in the area of vocational guidance and career development theory, the Tennyson article includes a 131--item bibliography which appears to be an excellent source of additional information.

Self-Concept

An example of a theory which has become the focus of growing interest and cooperation by researchers in vocational-technical education is the self-concept theory. Another is the theory of work adjustment, which is described in the following section. Both are a step closer to the mainstream of behavioral science than the traditional trait and factor theories which relate a test score, environmental factor, or some other single measure to performance in a selected occupation.

An excellent review of research relevant to self-concept theory as it applies to vocational education, is found in a doctoral study by Wamhoff (1969, 2.b.). Wamhoff's study is an extension of work by Brookover (1967, 2.b.) and is related to basic concepts of a theory of occupational choice development by Ginsberg (1951, 2.b.), and Super's self-concept theory (1963, 2.b.). Wamhoff developed and used an instrument similar to one used by Brookover in the study of high school students' concepts of their academic ability as it relates to school achievement. Another dimension of the theory which Brookover and his associates developed is the social dimension which drew upon the interactionist theory of Mead (1934, 2.b.).

A full and adequate description of the self-concept theory cannot be given here. Such a description would include such high-toned terms as "symbolic interactionism," "social-psychological frame of reference," and "significant others." When the theory is applied to the self-concept of vocational ability, we would expect to see the student limited in his vocational development by what he thinks of himself. We would also expect to see him make career choices consistent with his self-concept. A student would not necessarily achieve at a high level simply because he has a high level concept of himself. But he would be unable or unlikely to achieve at a high level if he has a *low* concept of himself.

A basic premise in the Wamhoff study is that the self-concept of vocational ability is not a remote psychological construct. It is, in effect, whatever the student might feel about himself, and it is assumed that the student is fully aware of and able to accurately report what his self-concept is. The

social dimension of the theory is brought in with the assumption that the self-concept is mainly a product of what people who are important to the student are perceived to be communicating to him.

To measure the self-concept of vocational ability Wamhoff developed a questionnaire patterned after that which was in use by Brookover to measure the self-concept of academic ability. The instrument is short, asking such questions as "Do you think you have the ability to do any job you desire?" and "Compared to your best friends how well do you feel you can do any job?"

Some of the findings reported by Wamhoff led him to conclude that there was a "substantial relationship" between the students' self-concepts and their perceptions of how others would evaluate their potential for success in high status occupations. Parents were most frequently listed as "significant others." The vocational students were found to have lower self-concepts of academic ability than nonvocational students while both groups were equal in their self-concepts of vocational ability. Most interesting was the finding that the self-concept of vocational ability was not related to the socioeconomic status of parents.

The Wamhoff study is likely to be followed by a cluster of doctoral dissertations and other limited scale efforts because the design and procedure are understandable, simple replications should be easy to manage, and a variety of student groups have not yet been tested. Also, the products of this type of research have fairly obvious implications for vocational education. However, the value of these efforts will likely be diluted because of the difficulty of finding what the researchers would call "constant referents." A referent such as "auto mechanic" might have high relevance to one individual and none at all for another, but both might respond in the same way on the measure of Self-Concept of Vocational Ability. Therefore, it is a gross distortion of the data to draw inferences about entire populations when the individuals vary in their perceptions of specific occupations.

Work Adjustment

Another theory which has been the focus of a concerted series of research projects is the theory of work adjustment. This theory "proposes that vocational satisfaction is a function of the correspondence between the reinforcers in the work environment and the individual's vocational needs." (Golden, 1968, 2.b.). Careful unraveling of a detailed description of this theory reveals the widely accepted notion that when a worker finds personal satisfaction (or satisfaction of his individual needs) in what happens on the job, he will like his job. In translating this bit of folklore into a scientifically respectable theory, one which lends itself to testing by statistical research, the fundamental concept becomes less obvious.

The theory builders and researchers are aware of the problem of measuring reinforcement, measuring satisfaction, and then being sure that they are really different entities. Golden and Weiss found a very high correlation

between the measures of these two factors, and expressed much concern for the problem of finding adequate measures of reinforcement in an employment situation. As is typically the case when broad theories about human behavior are subjected to stringent scientific testing, this research effort presents itself as a sophisticated, multidimensional enterprise. It appears that a great deal of effort is required to get a very small amount of genuinely useful information.

This particular study utilized questionnaires to measure needs, reinforcers, and job satisfaction. For each of the three variables there are 20 "dimensions" such as security, social status, variety, creativity, and working conditions. The major hypothesis of the study was that "The average satisfaction of the high-need low-reinforcement group is less than that of a high-need high-reinforcement group." The findings are presented so as to communicate with other researchers but the typical vocational education practitioner would likely find the report somewhat bewildering. This is not to detract from the quality or value of the project, but only to indicate what often happens when an attempt is made to test the validity of some fundamental assumptions in vocational education.

It was concluded by Golden that this study lends further support to the theory of work adjustment. Some of the specific findings were:

> The results support the previous study by Weiss (1964, 2.b.), in finding mean satisfaction scores lower for the "high need" group in a "high reinforcement" job environment than for a "low need" group in a similar environment. The results also support the validity of measuring reinforcer level by measures derived from employee ratings using the Job Description Questionnaire. Furthermore, additional support is obtained for the Minnesota Importance Questionnaire as a measure of vocational needs, and the Minnesota Satisfaction Questionnaire as a measure of job satisfaction.

Research Design and Relevance

The above two studies exemplify how research efforts can and perhaps should be coordinated within the framework of an articulated theoretical structure. The following study by Klaurens (1967, 2.b.) illustrates a type of research project which makes a much more direct impact upon the immediate problems of curriculum development in cooperative vocational education. This research might have been tied in with a number of existing theories. However, certain aspects of the study are obviously not directly related to theories which have been well articulated and developed. The total project is a series of small research efforts which are not tied together through a theoretical framework, but rather through the researcher's perception of important problems and considerations in distributive education.

A quick and easy test of the relevance of research output is to ask the question, "So what?" If a number of obvious answers seem to snap back at the questioner, the research product might be viewed as having high

relevance for the reader. The researcher's answers to the "So what?" question usually appear as a statement of recommendations or in a discussion at the end of the research report. The following items from the recommendations sections of the Klaurens study illustrate the kind of obvious relevance which many vocational educators hope to find in research reports.

1. Criteria for selection of training stations should include evaluation of potential satisfactions in training positions.
2. Planned experiences on the job should provide opportunities for student trainees to experience psychological growth through work activities that challenge their abilities.
3. Student trainees should receive their initial training experience in positions where supervisors and co-workers are suitable role models and are individuals with whom the student trainees can interact.
4. Student trainees should enter the initial job with basic skills and some specialized competencies which will prevent them from experiencing failure and equip them to experience achievement, recognition, and responsibility in their training.
5. Student trainees should have learning experiences which help them to be tolerant of the needs, values, and personal characteristics of co-workers, supervisors, and customers.

The central problem of the Klaurens study was to identify factors in occupational experiences of students that are associated with job satisfaction. The study was expanded in a number of different directions, touching upon personal adjustment, occupational performance capability, emotional adjustment, career plans, and others.

The procedure of the Klaurens study included semi-structured interviews with selected student trainees. The information was coded and classified according to a system which seems to be applicable in a variety of research settings. Some of the findings of this study appear to suggest important directions for the development of curricula designed to assist the student in developing the "work ethos" to which Borow (6.c.) refers. For example, it was found that interpersonal relations with co-workers and supervisors was a factor which was frequently associated with job satisfaction. Failure to perform the job well, poor working conditions, and the lack of recognition for work well done, were some of the factors associated with job dissatisfaction.

As a final point, it might be observed that the Klaurens study could be used as a model for other studies designed to provide information which would be useful in the development of instructional objectives in the affective domain.

Understanding Students With Special Needs

Thus far the studies reviewed have been conducted within the traditional boundaries of vocational-technical education. Now attention is given to

several projects dealing with essentially the same problems, but which were conducted with a very specific student clientele as the focus concern. Typically these researchers do not identify themselves with specific occupational fields, showing little or no concern about the needs of the labor market. They are basically concerned about, and identify themselves with, a specific student group, relating freely with any and all occupational fields in which their students might find employment. These studies are described here because they appear to be in some respects worthy of emulation and because they offer some interesting comparisons with the studies already discussed.

Two studies of "educable mentally handicapped" (or "retarded") were concerned with the self-concept of vocational ability and with vocational aspirations, using entirely different terminology from what was used in the studies described earlier. The study by Jones (1966, 2.b.) used the term "vocational outlook" and the one by Gorelick (1966, 2.b.) referred to a similar construct in terms of "the vocational plan" and "the vocational aspirations." These are all highly related concepts as is shown by a comparison of the stimulus questions which were used in the various instruments:

Self-Concept of Vocational Ability (Wamhoff)	"Do you think you have the ability to do any job you desire?" (and similar questions)
Vocational Outlook (Jones)	"Could you ever ____ (be a dentist, be a car hop, own a bank downtown, operate an elevator, etc.)
Vocational Plan (Gorelick)	"What job do you think you will be able to get when you get out of school?"
Vocational Aspiration (Gorelick)	"What job would you like if you could choose any job in the world?"

The "could you ever" scale was developed by Jones for use in his study. It was subjected to a pilot administration to students and teachers. Students' scores were considered to be correct when they indicated that they could do what instructors of educable mentally handicapped students think the students are capable of. The test score was derived by counting the number of "correct" perceptions. A high score indicated an "appropriate" vocational outlook and a low score was labeled "inappropriate."

The apparent rationale supporting the method used in developing the "could you ever" scale is in striking contrast with the theory presented by Brookover and adopted by Wamhoff, mentioned earlier, which postulates a relationship between the perceptions of "significant others" (the teachers in this case) and the perceptions the student holds about his vocational ability. If the Brookover theory had been postulated in developing the "could you ever" scale, we would expect the use of "experts" to be unacceptable. A more appropriate procedure would have been one similar to that used by Gorelick, as described later.

The problem of the Jones study was to determine possible relationships between vocational outlook of educable mentally handicapped adolescents and certain aspects of the high school program in which they were enrolled (course offerings, facilities, services, expenditures). No significant relationships were found. Another part of the study was concerned with possible relationships between the appropriateness of the student's vocational outlook and his age, sex, race, intellectual level, reading ability, work experience history, and home background. Girls as a group scored significantly lower on the "could you ever" scale than boys indicating that they are less appropriate in their vocational outlook. Non-white subjects were more inappropriate in their responses than white subjects. Low I.Q. students also received lower vocational outlook scores. One finding of particular interest for this review, was that students who had been employed in on-the-job training or work experience programs improved in vocational outlook following the experience.

The Jones study illustrates an approach which assumes that the first step in curriculum development is to identify, then describe in detail, the student clientele, leaving questions of instructional content and method, employment opportunities, and the like, for later. The following three studies are similar examples.

The Gorelick study is one which might be described in detail if space would permit. It produced a large amount of information, much of which appears to be very useful. It illustrates the kind of large scale effort that is required in vocational education if the research product is to be of substantial value. It was a two-phase study with 32 variables under investigation in the first phase and 116 in the second. The two phases represent a very desirable design feature. First, the students were interviewed at a time when they were still in school as students, and again after they had been employed at a later time. This longitudinal approach made it possible to determine the extent to which the vocational plans and aspirations identified earlier, had been realized. The second phase, after high school, included a very thorough examination of socioeconomic characteristics.

One striking feature of this study in contrast with others reviewed above is the directness and clarity of the report. Also, the study is apparently well designed. The impact of these two features in combination is refreshing, especially after an arduous effort to comprehend reports which seem to have been written to an audience of sophisticated research specialists. The Gorelick research report gives attention to the traditional statements of hypotheses, descriptions of data processing techniques, and the presentation of statistical tables. But it does not dwell on them at great length nor does it let them stand alone for the reader to decipher. Sophisticated analysis and interpretation procedures were used and were reported so as to give credibility to the research, but the report can be read and understood by the casual reader. Because this type of research is the order of the day in vocational-technical education, the following very brief description is presented, using fragments of the research report summary (Gorelick, 1966, 2.b.).

Purpose. The large number of educable mentally retarded (EMR) individuals in the nation makes it essential to find effective means of successfully integrating them into the community as wage earners and citizens. The purpose of this research was to find a way of predicting the post-school Employment Success of EMR adolescents. The level of Vocational Realism of high school EMRs was assessed, and the relationship between Realism and post-high school Employment Success was studied. If it were found that EMRs at a particular level of Realism were the most successful vocationally, then the concept could be used to evaluate school programs in terms of their effectiveness in fostering Realistic or Unrealistic vocational plans.

Hypotheses and Objectives. The major hypotheses of the study were: a) high school EMR students who were assessed as having Realistic Vocational Plans would be more successful in post-school employment than EMRs who had Unrealistic or No Vocational Plans; b) EMRs who were in work experience programs in high school would have more Realistic Vocational Plans than EMRs not in these programs. The general objectives of the study were to determine the significant correlates of the level of Vocational Realism in high school and post-school Employment Success.

The Sample. The study covered a two-year period and was divided into two phases which included the high school and the post-high school EMR. The final sample for the first phase included 886 tenth to twelfth grade EMRs with IQs between 46 and 79, who were drawn from 39 high schools with special training classes located in 10 school districts representative of different socioeconomic levels in Los Angeles County.

The subjects for the second phase of the study were drawn from a total of 280 EMR students who had been interviewed in Phase I and who had subsequently either graduated from or dropped out of school. Of the 280 possible subjects, the final Phase II sample contained 149 EMRs (74% had graduated and 26% had dropped out).

Data Collection Instruments. In phase I, a semi-structured student interview was used to record the EMR's Vocational Plans, Vocational Aspirations, knowledge of the job requirements of his Plan, persons who helped formulate Plans, information regarding his family background, and his school program including work experience.

Data from school records were used to obtain information regarding race, sex, birthdate, grade, IQ scores, health, and school attendance. A semi-structured administrator interview was employed to gain information regarding school curriculum and counseling programs. A teacher questionnaire was given to all the EMRs' teachers to obtain information on the teacher's background and teaching preferences.

Phase II used two interview forms, one for the EMR and the other for his parent or guardian. The questions asked in the parent interviews roughly duplicated those in the EMR interview with the idea of verifying the information provided by the retardate. A great deal of information was sought including personnal data, any changes in the level of Vocational Plans and Aspirations since leaving high school, employment history, educational history, and social-recreational data.

Data Analysis. A large amount of descriptive information was collected concerning the EMR in high school and in the post-school period. In the general discussion, percentages were used most often. When hypotheses were being tested, four techniques were utilized: chi square, product moment correlation, analysis of variance, and discriminant analysis.

The summary of the report continues with a presentation of the specific research findings, summarizing the descriptive data and the results of the testing of hypotheses, and continuing with a brief statement of conclusions. Following are a few samples from the conclusions section.

> The hypothesis that the Realistic EMR would be more successful in terms of post-school employment than the Unrealistic or No Plan EMR was not confirmed. On all measures of Employment Success the Realistic EMR maintained a middle position.
>
> The hypothesis that EMRs with formal work experience in high school would be more Realistic was partially confirmed. The confirmation applied only to those EMRs who were employed off-campus through Work Experience Programs or who were employed independently of the school. . .
>
> Some significant correlates with Vocational realism were found. . .In terms of Vocational Plan, Aspiration, and Education Plan, the Unrealistic male was consistently Unrealistic; he also exhibitied a stability in maintaining the Unrealistic Plan over time. . .
>
> The Realistic male was characterized by his socioeconomic environment he was likely to be a Caucasian from a middle income home in which the father was present. . .
>
> The No Plan male tended to have an Unrealistic Aspriation in high school and maintained this Aspiration in the post-school period. He seemed to be greatly influenced by his socioeconomic environment. The No Plan male was apt to be a Negro from a lower income family where the father was not present.
>
> A majority of the schools in the study did not keep adequate records concerning counseling contacts, follow-up procedures, and curriculum for EMR high school students.
>
> The post-school training engaged in by the EMRs in this study appeared to have little vocational value for them.

Following the conclusions, of which the above are only a sample, a carefully prepared and thorough statement of the implications of the study

is presented. The nature of this portion of the report, and its relative importance in the total presentation, indicates that these researchers are more concerned about the *product* of their research than about the *process*. They relate their findings to those of Ginsburg, Super, and others. Recommendations are addressed to guidance, curriculum development, teacher training, and the like. They do not hesitate to suggest what might be "between the lines" of their reported findings. A brief sample will serve to illustrate.

> *Work Experience.* Some school districts are instituting or reinforcing on-campus training programs as the major focus in work preparation for EMRs. Although it is hoped these experiences will help develop positive attitudes toward work and interpersonal relations, the present research does not show this type of program to have the power to build in and transfer these attitudes and skills to the outside world of work. The present sheltered on-campus type programs may not have the impact of reality which could be obtained in an off-campus work experience situation. . .

One design weakness, which is acknowledged by Gorelick, should be mentioned here because it detracts from the creditbility of some of the statistical findings, and because it is a weakness of much of the research of this type. The weakness is in the identification and measurement of employment success. Finding suitable criteria of employment success, and validation of those criteria, is a difficult and long neglected task in vocational-technical education. This study illustrates the usual compromise, that of using the "best available" data. Success criteria need to be studied along with behavioral change resulting from a variety of factors. In this study the measures that were selected as reflecting employment success were whether or not the students found jobs on their own, whether or not the individual held a job for at least two or three months, total number of hours worked, total income earned and income per month since leaving school. Some of these measures are clearly interrelated. They seem also to be only remotely related to the usual concepts of "success" in employment. It appears that whether those students identified as successful were adequately productive, efficient, or well adjusted on their jobs, remains somewhat in doubt. While in theory, "satisfactoriness" may be inferred if the employee is retained on the job (as postulated in the Minnesota Theory of Work Adjustment, Golden, 1968, 2.b.), as a practical matter, an individual may be very unhappy in his job, but keep it because he feels he cannot find one that is satisfactory.

Like the previous two studies, the following two are concerned with a specific student group, in this case the young deaf adult. The first (Boatner, 1964. 2.a.) was conducted in New England and the second (Kronenberg, 1966, 2.a.) was conducted in the Southwest, using essentially the same design and producing similar findings.

These studies of the young deaf adult are reviewed in some detail because they represent another desirable model for research in vocational-technical education. In contrast with the Gorelick study, which was a very large scale effort, these studies employ a design requiring nominal resources

and research talent. The design also appears to fit nicely into situations where a companion study of the employment community is feasible. The two research projects could be blended and some resources could be economically used for both.

There were three broad objectives of the Boatner and Kronenberg studies. The first was to assess the occupational status and vocational preparation of the students. This part of the study gives a picture of where the student stands with respect to the cognitive learnings and occupational competencies required for effective performance as a worker. The second broad objective was to learn about the students' aspirations, aptitudes, and capabilities, to provide the basis for judging their performance potential and directions of career development. The third broad objective was to demonstrate the need for a regional vocational-technical education facility to serve this particular group of students. The third part of the study is not considered here because it is not directly concerned with the student learner.

An important feature in this type of study is the utilization of advisory and planning committees to assist in the investigation by reviewing the design and expediting the collection of data. (They could perform similar service in the community survey.) Data collection forms included an interview schedule for young deaf adults, an interview schedule for the immediate supervisors of young deaf employees, a questionnaire for the administrators of schools attended by one or more deaf students, and a form for description of the vocational education programs in the schools. The General Aptitude Test Battery was administered. Four interviewers were selected, and trained when the interview schedules and questionnaire were developed and field tested, before the data collection process began. After the data were collected, tabulated and summarized, the advisory committee participated in the interpretation of the findings and the preparation of the conclusions section of the report. Finally, the planning committee met to discuss the implications of the findings for the deaf student, and to translate the information into specific program development strategies and plans.

The above design appears to be adaptable to the study of a variety of student groups. Some easy modifications might include the substitution of other measures, assessment techniques and devices such as the GATB, by developing advisory and planning groups of a somewhat different character but utilizing them in the same ways as suggested above, by gathering data using procedures other than interviews and questionnaires, but processing it in approximately the same way.

One of the recommendations of the Kronenberg study was that a valid instrument be developed for measuring the vocational aptitudes of deaf persons. This recognizes the problem of using the GATB in this situation. Since it was developed using a general population, its use with this very unusual population may not be proper without extensive validation and the development of norms for the deaf. This case illustrates the *misuse* of standardized tests (again, because they are the "best available") which draws criticism to the research efforts of vocational educators.

With respect to the occupational status of the young deaf adult it was found that the unemployment rate was 17 percent; 71 percent of the males were in semi-skilled and unskilled positions (double that of the national proportion); their wages were 22 to 25 percent lower; supervisors of 95 percent considered the deaf to be average or better in their job performance.

Vocational aspirations were determined by asking what job the individual would like to have in 10 years. Only 17 percent were content with present employment, while 83 percent aspired to professional, technical-trade, or business and distributive positions requiring more skill and training. Also, it was concluded on the basis of a variety of other data, that many of the young deaf adults were underemployed.

The General Aptitude Test Battery scores indicated that the young deaf adults are significantly inferior to the general adult population on the highly verbal aptitudes and superior in form perception and manual dexterity. When the GATB scores were used as predictors, this group showed sufficient aptitude for success in 753 of 840 occupations, but none of the students tested produced scores high enough to indicate probable success in a standard four-year college program.

Concerns and Expectations

Another type of study which might provide pertinent data in preparation for the development of cooperative vocational education programs was conducted by Cushman (1967, 2.a.). This procedure could be added to and integrated with the design described above, involving the use of advisory committees in development of the research instruments and to interpret the findings.

The Cushman study is not only concerned with prospective student clientele, but also with their parents and prospective training sponsors. Therefore, it has some of the elements of a community survey and might have been reported in Chapter III. A patterned interview procedure was used to gather information about the concerns and expectations of students, their parents and employers, who were likely participants in a cooperative off-farm agriculture program. The interview schedules were carefully prepared, field tested, and revised. Trained interviewers were used. The first portion of the interview consisted of a detailed description of the "directed work experience concept" and a listing of duties and responsibilities. Next, the person being interviewed was asked to express his concerns, expectations ("feelings of marked uncertainty or hope"), assuming he were to be involved in the program. No prompting was given at first. After free responses were recorded, specific areas were suggested including the kind of work responsibilities and hours of work. It should be noted that these cues were not the kind of leading questions that might appear in a structured questionnaire, Q-sort, or other such instrument. It is interesting to observe that the final form of the interview instrument is very open-ended, even though the preliminary version was developed on the basis of a review of literature which produced a long list of anticipated concerns and expectations.

A synthesis and interpretation of the findings of the Cushman study produced some practical information as input for program development and implementation. Following are a few selected items.

Most prominent among student concerns was whether or not the work experience would have educational value. They expected to receive specific training for an occupation, academic credit for the work experience, varied and interesting assignments, pleasant, fair, and helpful supervision, at least the minimum wage, and that the experience would lead to further training. Parents' concerns and expectations were consistent with those of the students.

Employers were concerned about whether or not the students would work long enough to be productive and worthwhile and whether they would have a voice in selection of student employees. They expected that the students would perform a variety of tasks, have good work habits, and desirable personal attributes. They wanted the school to provide specific occupational training, provide effective coordination, and they expected the coordinator to solve problems that might arise. They would insist that the students work at one job in blocks of time long enough to make it worthwhile.

The findings of the Cushman study, as shown above, illustrate the pervasive dilemma of cooperative vocational education. The employer expects productivity while the student expects the activity to have educational significance. But as the productivity of the student increases, the educational significance of the activity drops off.

In the chapter which lists implications of the Cushman study, it is obvious that the dilemma remains as a concern of the researchers. In effect, they suggest that the reader should worry about it but they do not suggest specific ways to get off one horn or the other. One implication that they *might* have drawn would be consistent with the fundamental concept in the definition of cooperative vocational education, given earlier, which stresses the necessity of a commitment to the educational development of the student by *both* partners in the enterprise. They might have recommended that training sponsors be selected from among those who *expect* to sacrifice the usual productivity for educational significance, and who show a willingness to utilize their production as a vehicle for education. Or possibly they might have recommended that, in promoting and developing the program, the prospective employers should be persuasively encouraged to accept this philosophy, viewing their role as an educational one—helping them to see themselves as part of the "downtown faculty."

An alternative which would place the student on the opposite horn of the dilemma, would be to persuade him and his parents to be content with less educational significance in the employment activity.

This is not to criticize the Cushman study. Like most good research, it provides information which helps to define problems with more precision and which provides a more substantial factual base for decision-making. But it does not dictate the decisions or solutions.

Comprehensive Research Design

The studies reviewed to this point would fit within the theoretical framework outlined in Figure 1, under the top center heading titled "student clientele." These studies were designed to stand alone with no direct connection to other research under the heading of "education" or the "employment community." In contrast with this approach is the comprehensive research effort which integrates several of the components of the suggested model. A study conducted by the Stanford Research Institute illustrates this research design concept (Bushnell, 1963, 2.a.). The project consisted of a series of related research effort's some of which are listed below under the three component headings:

Employment Community	*Student Learners*	*Education*
Projected growth in demand for workers	Experience and Background	Present training practices
Output of existing apprentice programs	Attitudes toward present programs	Programming costs
Effectiveness of existing programs	Attitudes toward present work	Selection of equipment
Job descriptions	Career Aspirations	Instructional techniques
Task analysis	Expectations of change	Teaching machines vs. programmed learning
Specification of knowledge and skill requirements		Programmed learning vs. live instruction
		Experimental program vs. previous courses

The reader should not assume the above list to be an accurate or adequate description of the scope and design of the Bushnell study. Much more was involved, and a detailed review could show other ways in which this large scale research project corresponds to the theoretical model described in Chapter I. At this point the portion of the study concerned with the student-learner is reviewed. Other facets of the Bushnell study are considered where they appropriately fit in following chapters.

The Bushnell study illustrates a high degree of cooperative effort in the utilization of community resources. Participants included organized labor (the International Brotherhood of Electrical Workers), a trade association (the National Electrical Contractors Association), and an educational institution (the College of San Mateo). The student clientele were journeymen electricians and the broad purposes of the project were to develop an effective voluntary adult education program to serve this student group, and to contribute to the manpower development needs in one segment of the labor market.

In studying the journeyman electrician, an unusually large variety of procedures and techniques were used and the result was an apparently accurate, multidimensional description of this distinct student-learner

group. In reviewing the study it becomes obvious to the reader that the data produced were of critical importance in program design and implementation.

Chapter 3 of the Bushnell study summarizes and interprets the findings of the research on the journeyman electrician in San Mateo County. Sections are devoted to occupational experience and other biographical data, attitudes toward present employment, attitudes toward voluntary training programs, career aspirations, expectations of change, and a few paragraphs of comments. In the interest of brevity, the comments section is presented here as a review of the findings and to illustrate how they contributed to the development of the instructional program.

> Because of the diversity of background and experience of the trainees, a journeyman training program must offer each participant ample opportunity to explore in depth the information to be learned, based upon his own ability, and at his own rate. Absence from the educational scene for 12 years or more will probably necessitate that a number of journeymen review the fundamentals of electricity before qualifying for more advanced study.
>
> Most journeymen are interested in performing quality work, and seek out interesting, challenging assignments. Some may not be aware of the value of informal training in obtaining these objectives.
>
> In selecting course materials that relate to specific job problems, the journeyman is likely to apply the pragmatic criteria of usefulness and comprehensibility to a course of study. Their comments concerning previous courses underscore the significance of keeping the information to be learned on a simple and straightforward basis. Permitting this type of student to work with carefully programmed instructional materials should be an advantage. Those with previous records of disinterest or failure will also need encouragement and careful handling if an interest in training is to be rekindled.
>
> While job security has been high during the previous decade, most of the journeymen anticipate "some" to "many" changes in the next five years. Older workers tend to be more satisfied with their training for their present work than younger workers. They would be, therefore, less likely to feel motivated to take part in a training program. Since it is this older group who will require an increasing amount of training as time passes, the problem of convincing them of this need becomes more difficult.

Popular Research Topics

This completes the review of studies selected for illustrative purposes. Following is a summary showing popular research topics. It might be noted that the emphasis appears to be on assessment of highly personal psychological constructs rather than on characteristics which are more easily measured or identified such as biographical data, educational achievement, and occupational experience.

Research Topics	References
Personality, attitudes and personal values.	Bernstein, Brazziel, Briggs, Cushman, Harper, Herman, Klaurens, Parrish, Thompson.
Personal adjustment.	Bernstein, Harper, Klaurens.
Self image.	Golden, Gorelick, Haarer, Harding, Herman, Jones, Kaufman.
Aspirations.	Bushnell, Gorelick, Howe, Jones, Judge, Keig, Klaurens, Parrish, Schill.
Job satisfaction.	Bushnell, Harper, Howe, Golden, Kaufman, Klaurens.
Academic ability and achievement.	Bernstein, Bledsoe, Jones, Mills, Parrish.
Experience or occupational competence.	Boatner, Harper, Klaurens.
Biographical and environmental data.	Department of Labor, Edgerton, Gorelick, Herman, Jones, Howe, Kaufman, London, Parrish, Scruggs.

To conclude this chapter without a definite statement regarding the "state of the art" in studying the student learner, violates the fundamental review and synthesis concept. On the other hand, to derive such a statement from the limited perspective provided by this project, might be a greater violation. Therefore, a few additional studies are briefly reviewed in the following paragraphs with the hope that they will give added perspective and with the hope that this limited effort will be followed by a more thorough appraisal of existing research in this important area.

Description and Comparison Studies

Two monumental research projects, the annual *Manpower Report of the President* (Department of Labor, 1969, 3.a.) and a large study of vocational education in the secondary schools conducted by the Institute for Research on Human Resources at Pennsylvania State University (Kaufman, 1967, 2.a.), provide much relevant descriptive information. Major emphasis in these studies is on biographical and environmental data, especially with respect to student-learner groups for whom vocational education is or should be provided. Discussion of the Kaufman study also appears in Chapter V where it is cited as an example of program evaluation on a national scale. The *Manpower Report* is reviewed in the next chapter as an important source of information about the employment community.

The Kaufman study provides a good example of a very popular research design concept, that of comparison of one group with another. The Wainhoff, Kronenberg and Boatner studies, as well as most of those which follow, employ this technique. Kaufman compares Negroes with whites on

such factors as socioeconomic and environmental characteristics, employment and I.Q. He compares males with females on many factors. He compares graduates of vocational, academic, and general curricula.

Edgerton (1967, 2.a.) compared job corps trainees with the general population of the same age, on various biographical and environmental factors. The trainees were found to be in the lower ranges of the total youth population in terms of high school graduation and highest school grade completed, more were heads of households and most were employed in unskilled jobs.

The group comparison technique is particularly popular in doctoral studies. Five examples concerned with cooperative vocational education students are briefly reviewed in the next few pages. Then, to conclude this chapter, four descriptive studies are reviewed.

Mills (1963, 2.a.) compared the academic achievement of distributive education cooperative program participants with comparable students on the basis of available normative data, including mental maturity test scores, class rank, grade averages and drop-out rates. Eighty-five high schools located in 28 states were included in the sample. It was found that the participants in the cooperative program showed a greater tendency to complete high school than their fellow students; mental maturity scores and class rank of the cooperative students was low, with more than 70 percent in the lower half of their graduating classes; achievement of the cooperative students compared favorably with their abilities as reflected in their mental maturity scores. These findings suggest that a refutation can be made of the charge that cooperative vocational education cannot be tolerated because it prevents high school students from getting a good basic general education.

A similar study by Bledsoe (1968, 2.a.) compared the educational development of diversified cooperative education students with a control group of comparable students who were not in the program. In this instance both groups were actually subjected to the same assessment procedure, the Iowa Tests of Educational Development. Student groups were matched on the basis of data collected from individual cumulative records. The sample was limited to selected secondary schools in Indiana, with 95 subjects in each group. In contrast with the Mills study, no statistically significant differences were found within female groups, within male groups, within any of the schools, or between the experimental and control groups in total. This leads one to question the assumption underlying the Mills study, that a national sample of distributive education cooperative students is homogeneous. It might be interesting to see if there is variability among large, medium, and small schools, among states, between urban and rural schools, etc.

The third example of comparison of cooperative vocational education students with other groups is a dissertation by Harper (1968, 2.a.). This study compares drop-outs with continuing students in work-study programs for the mentally handicapped. The characteristics that were analyzed and compared related to the subjects' in-school adjustment, post-school adjust-

ment, and vocational success. School records, interviews and questionnaires were used as data sources. A number of differences were identified, most indicating that the drop-outs showed less desirable characteristics than the continuing students. Continuing students were obviously more employable but there was no difference between the groups on overall job ratings by the employers. There were no marked differences in parental background or other biographical factors. The only difference revealed by the employers was that the program graduates had more desirable and positive attitudes than the drop-outs. Also, the graduates made significantly more successful social adjustment and demonstrated higher vocational competence. This lends support to Borow's suggestion that cooperative vocational education should be used to assist all students in development of the "work ethos."

The fourth example (Bernstein, 1968, 2.b.) is a comparison of the work values (measured by the Work Values Inventory developed by Donald Super) of a group of disadvantaged high school cooperative education students with those of a comparable control group. Changes in work values and personal adjustment were also measured and incorporated into the research design. The study is a good example of the application of sophisticated research methodology, predictive and criterion measures which have acceptance in the community of psychological researchers, and careful reporting to an audience which is assumed to be concerned with methodology as much as with the product of the research. While the following summary statement should not be viewed as representing the essence of the 265-page dissertation, it might serve to indicate something about the product of this study.

> For the most part there was little evidence of any work value differences between the co-op and the control students. Correlations between the work values and academic achievement, personal adjustment, and job performance were generally low. Nonetheless there were sufficient findings to encourage further research in the area of work values and to indicate that the study of work values might be a meaningful approach to understanding the vocational development of disadvantaged youth.

The fifth and final doctoral study in this set of examples (Briggs, 2. a.) compared the personality characteristics (using the Edwards Personal Preference Schedule) of students in a work-study program at Colorado State College, with a group who were not participants in the program. Comparisons were made within groups on the basis of sex, grade point average, and whether or not the student dropped out of school. Findings were presented as follows:

> A significant difference was found, at the five percent level, between the low grade-point average male group and the male group of drop-out students on the variable, Heterosexuality. The male drop-out students indicated a lower need for heterosexuality than the low grade-point average males. The high grade-point average female students were found to differ significantly from the low grade-point

average female students on the variable, Endurance. The female low grade-point average students indicated a lower need for endurance than the high grade-point average female students.

It should be noted that the Briggs study involved entire populations rather than samples. Since the population engaged in the Work-Study Program at Colorado State College was small, the numbers of subjects in each sub-group classification were so small (from three to five for males and from five to 23 for females) that even though the analysis included "the Dunn *c* Procedure for multiple comparisons as a test of significance," any generalization based on this study would be difficult to justify.

The latter two doctoral studies, involving measures of "personality," "work values," and "personal adjustment" produced findings which might be questioned on the basis of the validity of the measures as used in these studies. They produced findings which appear to have minimal applicability for program development or instructional content, in contrast with those studies concerned with more accessible and, perhaps, more mundane characteristics of the student learner. This not to say that the study of inaccessible and vaguely defined constructs such as personality, work values, and personal adjustment is not of considerable importance. Perhaps such investigations are potentially most important of all, if and when researchers can more accurately define and measure them. The point to be made here is that the apparent cost-benefit payoff of these particular research efforts is quite low, unless a very high value is placed on the *added* educational significance, as compared with studies which utilize well-defined and easily measured constructs.

Descriptive Studies

The last four studies to be reviewed in this chapter illustrate a number of departures from the general pattern of the previous group. They are not comparative studies, but simply descriptive of a single student-learner group. They were conducted outside the mainstream of vocational-technical education and did not involve cooperative programs in the traditional sense. They are very briefly considered here because their findings might have meaning for cooperative program design and implementation in the vocational-technical education community, and because they illustrate several patterns of investigation and several research design concepts which might be utilized in cooperative vocational education.

Howe (1966, 2.a.) conducted a study titled "occupational problems and vocational training needs" which produced a descriptive profile based on interviews with 102 Iowa high school drop-outs. This was a small, inexpensive study which produced a considerable amount of biographical and environmental data and other information easily derived through personal conversations. Simple tabulations were used to summarize and report the findings.

On a much larger scale and with the effective use of more resources, a similar design was employed in a study of 601 young Negro ghetto residents who were seeking work through a Neighborhood Youth Corps

program (Herman, 1967, 2.a.). Of particular interest was a follow-up study of 377 of the original 601 who were not placed in jobs within three months of their initial interviews. This, of course, was a comparative study to determine differences between those placed and those who remained unemployed. Some of the findings were: those who remained unemployed viewed the placement function of the Job Corps centers as far more important than the training and remedial services; they did not differ in any major respect from those who were placed by the centers; the centers were more successful in placing youths who were interested in training than those who just wanted jobs.

An unusual and interesting study was conducted by Marguerite Scruggs and Mary Fern Souder (1966, 2.a.) to determine interrelationships between home environment and employment success. Biographic and environmental data included social participation of the family, housing, psychological characteristics of the wife, food, family authority patterns, and even such unexpected factors as whether the wife preferred one 14 dollar dress over two seven dollar dresses. Formal statements of hypotheses and appropriate data processing techniques were employed. Much information was produced but the challenge of finding immediate applicability was left to the reader. Major recommendations were for additional studies, refinement, and validation of the variables used, and that consideration should be given to interviewing the husband as well as the wife, in future follow-up studies.

The final study to be considered in this chapter was conducted by the Virginia Employment Commission (Brazziel, 1964, 2.b.). The subjects of the invesitgation were 314 men who had been contacted personally and invited to enroll in retraining programs. Nearly all were Negro. The purpose of the study was to determine what factors might have influenced the decision to refuse retraining under the Manpower Development and Training Act. Detailed findings need not be reported here. The point is that this type of study might well be employed wherever potential participants refuse in large numbers, to become involved in programs designed to serve them. The approach used by Cushman (1962, 2.a.) could also be used for this purpose.

The Brazziel study employed a thorough and careful procedure. A number of difficulties were described in the report so that the reader who might want to follow the same research pattern would be able to avoid some pitfalls. The procedure is adaptable and flexible. Specific hypotheses were derived and tested using accepted methods. Findings are reported in terms which make their application to new manpower training program design and implementation clear. For example, it was found that the small training allowance was in most cases the reason for rejection of the program. The rejectors were found to be unacquainted with employment opportunities and unlikely to have been employed outside their home towns or in military service. They had less often worked with or near skilled tradesmen and their restricted experience might have made them prone to misunderstand the requirements for enrollment.

These findings highlight the importance of effective communication with prospective trainees as they are being recruited, and the need of an effective guidance program when the student clientele has been limited in its career development perspectives.

III

RESEARCH FOCUS: THE EMPLOYMENT COMMUNITY

Expanding Perspectives

By long standing tradition the development of cooperative vocational education programs has included a preliminary and continuing study of the employment community in which the student-learners found employment. The traditional community survey has been used as a means of assessing the manpower demands of the locality with the following three major purposes in view: 1) to assure the supporters of the program that graduates would find adequate job opportunities, 2) to assess and develop the community resources which might supplement and enrich the educational resources provided by the school, and 3) to assure the supporting populace that the educational system strives to serve the community by attempting to identify and meet existing needs.

Another well-established tradition in cooperative vocational education is job or occupational analysis for the purpose of determining what the students should know and be able to do in order to perform effectively in their chosen careers. Occasionally this component of the study of the employment community is integrated with the community survey, but the typical pattern is to view the two research efforts as being separate.

The traditional assumptions which have been used to justify the local community survey and the job analysis as a basis for program design are apparently changing and another set of basic assumptions is emerging. The result is not the abandonment of these two research activities, but rather a greater emphasis on them and an expanded perception of what they should include. Following are the revised assumptions or philosophical positions and the emerging concepts to which they relate.

First it has been assumed that the students would be selected from a large pool of prospective applicants, and that they should enter the program with predetermined occupational goals, with a willingness and academic capability which would indicate a high potential for success in the chosen career field. As pointed out in Chapter II, the emerging concept assumes an intensive investigation to become acquainted with the student-learner, as opposed to a predetermination of student-learner characteristics with emphasis on careful selection of vocational program participants from a large population. The basic philosophical change is the rejection of the notion that students should be selected to fit predetermined career specifica-

tions, and acceptance of the view that careers should be selected and job opportunities found to match the needs of the student clinetele with which the program planners have become acquainted and to whom they have a primary commitment.

The impact of this change on the investigation of the employment community is twofold. First, the community survey is broadened to include a whole spectrum of occupational fields or clusters, not with a primary concern for unmet manpower needs in all areas, but rather to identify an assortment of career opportunities from which the individual student may choose. Second, the accumulated information is adapted for use in vocational guidance and career development activities to a greater extent than in traditional programs.

In the past it has been assumed that the local community in which the educational program was located and the specific occupation in which the student was initially employed, were the proper focus of the community survey. The increased geographic mobility of trained workers, combined with their mobility in changing occupations and in moving from one industry to another, has brought about a broadened concept, recognizing that "the community" usually should be defined as a larger geographic area than the locality or school district in which the cooperative vocational program is sponsored. Also, traditional job analysis concepts are being enlarged to include intensive study of occupational clusters as opposed to narrowly defined jobs, and to include concern for a wider assortment of educational and training objectives along with the specific job skills and associated knowledge produced by traditional job analysis procedures.

These new assumptions abut the nature and scope of the community survey and job analysis place the local program planners in a difficult position. In theory, they should produce and/or gather information about a much larger community, about a wide assortment of occupations, and the information should be more applicable for guidance and curriculum development. Kaufman and Brown, in a research review concerned with manpower supply and demand and related topics (1968, 1.), make some disparaging remarks about the "lack of knowledge and lack of necessary tools for manpower analysis." They point out that:

> This raises the question of how useful manpower projections are for planning of vocational education in the form of a narrow specific type of training for a certain type of skill. Very detailed and accurate knowledge of the labor market is necessary, which is almost impossible in a market economy determined by many unpredictable variables. Furthermore, national projections are of limited use to the vocational educator, who is primarily concerned with the local area, yet local statistics are not widely available. Nevertheless, manpower analysis can indicate the broad magnitudes of change within occupational clusters. . .Thus it is more realistic to plan and train for occupational clusters than for specific occupations. Hopefully, this will also allow greater flexibility and smoother adjustments of supply in response to changes in demand.

With the emerging concepts of what the study of the employment community should accomplish, the following general pattern for the investigation seems to be appropriate. This is what should occur if we accept the assumptions identified above, and if program planners have the resources and skills to conduct such an investigation.

Tasks of Manpower Analysis

In theory, the study of the employment community might be viewed as including the five major tasks listed below. These tasks would be accomplished in an investigation of local scope by utilizing the best available data from sources such as the Department of Labor, national, regional, or state sponsored manpower surveys, large scale studies of the world of work such as the *Occupational Outlook Handbook,* and studies of the requirements for effective performance in selected industries or occupational fields. When the investigation is part of a statewide, regional, or national program development effort, program planners might expect to generate much of their own research data, particularly when the program is concerned with a limited spectrum of occupations or with a single industry. The five major tasks are:

1. Assessment of the manpower requirements for the employment community and projecting the demand for various types of workers.
2. Assessment of existing and anticipated manpower resources which might be available to satisfy the demand.
3. Using the information produced in steps one and two, development of an appraisal of job and career opportunities.
4. Assessment of existing and anticipated education and training resources which might have a significant impact on the supply of competent workers.
5. Selection of the industries to be served, the occupational clusters or careers, and the specific entry level and career development jobs in which the student clientele might receive on-the-job training and in which they might ultimately be employed.

Furthermore, it might be assumed that program planners should remain abreast of trends and developments by viewing the five major tasks as an ongoing effort, and that program modifications, adjustments, and innovations would occur in response to significant changes in the employment community.

The five tasks listed above are an abbreviated description of the emerging concept of the community survey. With reference to the theoretical model for the development of an educational program (see Figure 1) the information obtained in this portion of the investigation of the employment community would be used primarily in deriving manpower development objectives, and in defining the ways in which the educational program is to serve the employment community.

After the fifth task is completed it is possible to begin planning the instructional objectives. The body of information which is essential for

proper development of the instructional objectives is produced in the analysis of the selected careers, occupational clusters, industries, or jobs. It should be noted that the comments of Kaufman and Brown, cited earlier in the Chapter, with respect to the "lack of knowledge and lack of necessary tools for manpower analysis" might be repeated with respect to the tools and procedures for deriving appropriate instructional objectives from information gathered in the analysis of careers, occupational clusters, industries, or jobs. A variety of procedures and theoretical models are in current use, none of which has been widely adopted. Common to all these procedures or models, however, is the notion that the demands to be made upon the worker-to-be should somehow be used as input for a system which produces a description of what the student-learner must know, what he must be able to do, and the kind of person he must be in order to function effectively in his chosen career. Additional discussion and consideration of research related to the development of instructional objectives for vocational education is found in the last part of Chapter III and the first part of Chapter IV.

The remaining portion of this chapter is devoted to reviews of selected research reports. Not many were found in the search of the ERIC collection or in *Dissertation Abstracts*. Professional journals do not publish many such reports because they often have meaning only to those who conduct the research. Most difficult to obtain, of course, are the limited scale, locally oriented studies. Easiest to find are the large scale studies concerned with many occupational areas, many industries, and wide geographical areas. However, the following reviews can acquaint the reader with some of the various research reports which might be of value as source materials. Some are presented as samples of the various type of designs for research which might have wide applicability, and some exemplify the emerging concepts described in the foregoing portion of this chapter.

Manpower Analysis Studies

An example of a small scale study which was oriented to a single occupational cluster (this is a good example of the cluster concept), a single educational institution, and a limited geographic area, was concerned with: "The Need to Establish a Marine Sciences Technology Program at Shoreline Community College" (Teel, 1966, 3.a). It accomplished all the major tasks described in the expanded concept of the community survey and it produced a body of pertinent data from which instructional objectives could be derived.

The occupational cluster with which the Teel study was concerned included three related types of technicians described as follows:

> *Marine Biology Technicians:* do laboratory work which relates directly to the biological aspect of marine environments. These technicians work in laboratories such as radiation biology laboratories, shellfish research laboratories, etc.

Physical Oceanographic Technicians: work with physical processes which occur in the marine environment. These technicians work for the Coast and Geodetic Survey, the Oceanography Department of the University, etc.

General Biological Technicians: do routine laboratory work relating to the biological sciences but not necessarily in the Marine Sciences. These technicians work in food processing plants, for instructions such as the University research labs, etc.

One product of the Teel study is a list of "common skills" such as the ability to record and organize data, draw graphs and prepare preliminary reports, solve linear equations, use calculators and slide rules, perform simple repair of electronic instruments by using schematic diagrams and electronic testing equipment, and to communicate with people. The items listed under the specific technical areas appeared to represent an inventory of the tasks performed. Some examples are: to develop film and print using enlarger, to operate a kymograph, to maintain sterile conditions within a laboratory. This aspect of the study is explained more fully in the discussion of task analysis later.

The procedure included a personal interview survey of selected personnel employed by 28 of the major Marine Science laboratories on the Pacific Coast. The study was conducted during the summer months, with some of the college faculty as interviewers. In addition to the occupational analysis data described above, a body of statistical data was developed showing for each employer, the numbers and types of employees and projected needs in each area. The study also included an assessment of the resources available for training the needed technicians, and list of the reasons for the "phenomenal demand" for trained people in these occupations. The report is concluded with a persuasive and well-documented appeal for the establishment of a new program to train technicians in the marine sciences. This is a good example of a very brief study conducted with limited resources.

A study by Jacobsen (1966, 3.a.) offers some dramatic contrasts with the study reviewed above. It is titled "A Survey of the Technical Needs of Industry and Implications for Curriculum Development in Higher Education." The most striking contrast is in the sheer magnitude of the undertaking. While the Teel study was concerned with one educational institution, the Jacobsen study was concerned with all the two- and four-year colleges engaged in preparing technicians for industry across the United States. While the former was oriented to a cluster of technical occupations, the latter was oriented to the full spectrum of careers in the fields of chemical technology, and many more. The purposes of the study are described in the report as follows:

> The objective of this study was to survey and identify the technological and manpower needs of industry and to relate those needs to curriculum development in higher education. An attempt was made

> to determine not only the number of technicians needed by industry, but also the specific types of technicians and the talents which they should possess.

After reading the above statement, one is left with the impression that the scope of the project is unrealistic. But a brief review of the findings of the study, which are presented in over 100 beautifully prepared graphs, charts, multidimensional tables and figures, suggests that the stated objectives were achieved to a substantial degree.

The method used to gather the information was a mail questionnaire, which provides a much less desirable data source than the personal interview as used in the Teel study. It should be noted that there was only a 10 percent response to a saturation mailing. The researchers recognized that the sample could not be considered as representative of the population to which questionnaires were mailed. Therefore, inferential statistics were not employed in the analysis. Only descriptive statistics were used (means, medians, percentiles, and correlations).

The questionnaire was developed by first reviewing pertinent literature including the curricular offerings of schools which offer two- and four-year technical programs. Also, the *Dictionary of Occupational Titles and Codes,* industrial and professional organizations were used as resources. A trial questionnaire was developed and refined, based on its application in a pilot study. The resulting instrument includes 18 well-designed multiple response questions, a manageable task at first glance. But the nineteenth question is one which might be expected to intimidate the most ardent questionnaire addict. It is presented in the form of a two-dimensional matrix, with a list of 61 technical occupations on the vertical margin, 99 courses (from "algebra" to "Russian") across the horizontal margin. The 6,000 little cells are used for the respondent to record the degree to which each specific course is considered essential in training each specific type of technician. Since no interviewer was present to supervise the response, one might question the reliability of the data produced by this instrument.

While exact replication of the Jacobsen study is not recommended, it does represent a type of research which is much needed in the various areas of vocational-technical education. A better approach would be to coordinate a series of investigations which employ the expensive but more productive techniques of the Teel study, and which in combination would have the comprehensive scope of the Jacobsen study.

The two studies reviewed above illustrate the application of some of the emerging concepts outlined at the beginning of this chapter. Their design conforms quite well to the five manpower analysis tasks. In addition, they incorporate an occupational analysis procedure which produces the raw material from which instructional objectives may be developed. However, there is one important aspect of the theoretical design with which they do not conform. That is, they follow the traditional assumption that places identification of the occupational cluster or field first in the sequence of

events, they build their justification for establishing the programs on evidence of the needs of the employment community, and they apparently assume that the students will be recruited and selected to fit the program.

Chapter II includes reviews of several studies which identify the student population first, resting the case for establishing programs on the needs of students. The studies reported by Boatner and Kronenberg are the best examples. In these instances, some pertinent manpower survey data were reviewed but the main effort was in studying the student clientele in the employment situation with the rationale for program development resting on the anticipated improvement in the students' ultimate welfare as a result of the proposed training. The selection of careers for which the students were to be trained was based on the degree to which the requirements of that occupation conformed to the aptitudes of the students.

Manpower Data Sources

To continue the review of exemplary research projects, the following items are concerned essentially with manpower analysis, involving one or more of the five major tasks already identified. Next will follow a review of studies concerned primarily with occupational analysis, the ultimate purpose being to provide information for use in planning instructional content or objectives. Finally, a few miscellaneous studies will be briefly reviewed to illustrate other approaches to the study of the employment community.

The U.S. Department of Labor produces many documents which report surveys of the employment community on a very large scale. Among the most valuable of these, in the context of this review, is the annual *Manpower Report of the President* (1969, 3.a.) which summarizes and describes many research efforts concerned with manpower requirements, resources, utilization, and training. One section of the report titled "Meeting Individual Needs," reviews programs for special groups including American Indians, Spanish-speaking minorities, rural Americans, older workers, inmates of correctional institutions, and the handicapped. Another part of the report presents statistical information regarding industry employment trends, improvement in Negro employment, the geography of unemployment and underemployment, developments in the labor force with respect to young workers, population and labor force trends, and manpower requirements of the future. A large portion of the report is devoted to a review of manpower research and experimentation. This, along with the research review by Kaufman and Brown (1968, 1.), can provide the reader with a good perspective of the important trends and developments in this area.

As source material for the development of instructional objectives and for occupational information and guidance purposes, two other documents sponsored by the Department of Labor should be mentioned. They are the *Occupational Outlook Handbook* and the *Dictionary of Occupational Titles and Codes.* Since most readers are probably familiar with these, they will not be described here.

Manpower research oriented to a region, a state, and often to a smaller geographic area or community, may be found in profusion on the shelves of university and public libraries. These sources should not be neglected when vocational programs are being planned because they often contain an abundance of material which might be helpful for local program planning and implementation. A case in point is a study of "Resources for Southern Manpower Development" conducted by the Oak Ridge Institute of Nuclear Studies (Russell, 1965, 3.a.). This is a very large study, apparently very well designed and effectively managed. The research report does not give a detailed description of how the data were gathered, as it is obviously designed as a public relations or promotional document rather than as a research report to the academic community. It gives a very persuasive presentation and interpretation of the findings of the survey.

The Russell study contains information about labor force characteristics and manpower development and training resources of 15 southern states. Social scientists were used as interviewers, talking to several hundred staff members in 58 schools. Interviews were held with representatives of 35 different industries and with leaders in labor and public service agencies. The resulting descriptive data were used as the basis for a clear and interesting overview of the existing manpower resources and the critical areas of need. A series of very specific recommendations were made for utilizing existing resources more effectively. For example, it was recommended that an information service project be developed, including an information center, services to demonstrate projects, conferences and symposia, and a register of technical assistance sources. Other suggestions included utilizing universities through faculty participation, graduate research fellowships, manpower seminars, development of manned traveling exhibits, and a publications program. The point to be made by this somewhat detailed description is that much that is valuable to the planners in vocational-technical education is available in pre-packaged form, for the asking. However, these materials are not usually found in the distribution channels of the vocational-technical education community.

Comparing Task Analysis Models

This completes the review of research in the manpower survey category. Following are reviews of several research projects concerned primarily with occupational analysis for the purpose of providing information to be used in deriving instructional content and objectives, usually as statements describing the anticipated performance capabilities or behavioral outcomes after the teaching-learning process. This type of research has become very popular as a topic for doctoral studies and as the focus of a variety of large scale funded projects.

At the time of this review several large projects were underway but research reports were not available for review. Therefore, the reader may be disappointed to find that a project in which he may be particularly interested is not mentioned here. Some examples which come quickly to mind

are the New Office and Business Education Learning Systems project (NOBELS), a project identified as an Educational System for the Seventies (ES-70), Project Talent, and the National Assessment project. All of these studies have allocated substantial resources and energy to the derivation of teaching-learning goals through some elaborate system for extracting relevant data from the employment community.

The few studies selected for review here have been chosen because they are very directly concerned with cooperative vocational education or because they illustrate what appears to be an important style or method of occupational analysis and determination of instructional objectives. At this point an earlier observation bears repeating. It appears, on the basis of this limited review, that a variety of procedures and theoretical models are being employed in the analysis of careers, occupational clusters, industries, and jobs, but none has been widely adopted. There is wide agreement and concern about the need to effectively determine what should be taught, and equal concern about the need to make this information available in appropriate form. Therefore, we may expect the various theoretical models for determining what students should learn, to be tested through practical application, with the best eventually emerging with wide acceptance. At this point, however, the reader must use his best judgment and intuition in selecting his favorite.

The following three studies have much in common, and are reviewed as a group because they represent a type of research which offers the promise of bringing about important changes in vocational-technical education. They also represent contrasting approaches to the achievement of the same goal, the production of a comprehensive inventory of very specific objectives. All have adopted the concept of orienting the investigation to occupational clusters as opposed to single jobs. First the three projects are described to aid the reader in visualizing the general design features and the nature of the end products. Then some apparent similarities, contrasts, and personal observations are discussed.

The Allen study (1966, 3.b.) was an investigation of the aviation mechanics occupation in the four most important industrial categories: airline stations, airline overhaul stations, large general aviation companies, and small general aviation companies. The occupational cluster includes workers employed in the four industrial settings, where a variety of distinct specialties were included under the aviation mechanic title. Airframe and power plant specialists, for example, would have quite different jobs. The broad goals of the investigation were:

1. To investigate the technical knowledge and manipulative skills of aviation mechanics as required by the aviation industry.
2. To identify a core curriculum for the training of aviation mechanics.
3. To identify the scope of training offered by industry.

A questionnaire was used as the main source of data. It was designed and developed in a preliminary study and submitted to an advisory committee for approval. The questionnaire was designed to gather information

about the tasks performed by the aviation mechanic, as might be expected. But for each task identified, five other questions were asked. A very clever coding technique was developed, permitting the respondent to give all five responses with precision in a very compact space. The first impression is that the questionnaire is confusing, perhaps impossible to fathom. After careful reading and digestion of the instructions, however, the total image of what is expected comes through.

It should be noted that when the questionnaires were being completed, a trained interviewer was available to encourage the respondent and to provide instructions. In some cases the interviewer left the forms for completion at a later date, if he had confidence in the respondent's capability and willingness to do the job on his own.

In all, 401 companies and stations responded to the survey. The information was processed using a computer program which summarized the data and presented it in 52 tables using the same design as that used in the questionnaire. Each table represents a major topic heading and shows as sub-topics the tasks performed by the aviation mechanic. With each table is a one-page summary of principal findings and recommendations of the advisory committees.

To dientify a core curriculum for the training of aviation mechanics, the findings were reviewed by the advisory committee and a topic outline was produced. The list of topics and sub-topics is classified by "teaching levels" and "testing levels" according to the Bloom and Krathwohl taxonomy. Examples are given which show the reader how to develop an examination, with "instructional settings" for both teaching and evaluation which correspond to the "teaching levels" specified for the topics or tasks to be learned. A section of the report presents the findings which review the nature, scope, sources and methods of training offered in the aviation industries.

The second example of research to develop instructional objectives is one of a series of projects conducted at Washington State University to identify "task and knowledge clusters." At the time of this review it was not possible to obtain copies of all the research reports. Also, some of the projects were still in process. The items found in the search of the ERIC collection are listed in the bibliography (Perkins, 1966, 3.b.; Bakamis, 1966, 3.b.; Rahmlow, 1966, 3.b.; Ertel, 1967, 3.b.). Included in the series are projects concerned with office occupations, general merchandise retailing, building trades, electronics, food services, and child care. This series of projects illustrates the approach discussed earlier in which the primary concern is for serving a specific student clientele and in which the occupational fields for which training is to be provided are selected to match the needs of the students. To quote the introduction to the Ertel study (1967, 3.b.):

> The objective of our clusters research is to obtain facts about what major types of tasks are actually performed in occupations most likely to provide employment opportunity for substantial percentages of noncollege bound youth and to identify major types of knowledge most likely to prepare them for such work.

The occupations (listed above) were selected on the basis of Bureau of Labor Statistics projections. The project selected for review here is the Ertel investigation, which illustrates the general design, procedure, and outcomes of this group of projects.

The second of the two objectives identified in the above quotation had not been accomplished at the time of this review. The knowledge clusters associated with performance of tasks were to be developed by juries of employees, supervisors, and vocational teachers. At this point it is sufficient to describe the portion of the project devoted to identification of tasks.

The Ertel study employed a checklist questionnaire which was developed in consultation with employers, employees, and vocational teachers. A portion of the instrument was designed to obtain data on age, sex, major types of tasks presently performed by the employee and by the supervisor, and other background information. Project personnel delivered the questionnaires to employers and asked that the employer deliver the materials to respondents during a store meeting. If that were not possible, the instructions were that "the next best method is for the manager to distribute them to all employees while you are still there." Since the checklist contained 225 items for the employee and 332 items for the supervisor, it was obviously essential to use some persuasive effort to insure that the questionnaires were completed. By classifying the questionnaires according to the workers' occupational status and length of experience, some data were produced with respect to "combinations of major categories of workers in entry jobs and in positions representing career development opportunities."

The result of this phase of the study is a very long list of tasks, in functional groupings, with an assessment of the frequency of occurrence of each task in each Standard Industrial Classification. It may be assumed that the information about the knowledge required to perform each task or "cluster" of tasks would provide additional input material for the derivation of instructional objectives.

The third project in this series of reviews is a study by Lucy Crawford (1967, 1969, 3.b.) titled "A Competency Pattern Approach to Curriculum Construction in Distributive Teacher Education." The project objectives are mainly concerned with teacher education and only one phase of the research relates directly to occupational task analysis. The purpose was to determine "what competencies the distributive education student-trainee should have in order to enter and advance in (a distributive) career."

The determination of competencies involved three steps. First was the identification of critical tasks performed by workers in the field of distribution. Second, "A tentative list of technical competencies needed to perform the identified tasks was drawn from the literature, from personal experience of the investigators, and from conversations with business people." Third, the lists of technical competencies were evaluated by specialists in the distributive field and distributive teacher-educators. The evaluative procedure is described as follows:

> The list was mailed to the paired distributive specialists who were requested to evaluate each statement in terms of appropriateness

and clarity They were also requested to note whether or not they agreed with the selection of jobs needing each competency by crossing out the ones with which they disagreed and by adding other jobs they deemed appropriate. In most cases paired specialists met with the investigator to discuss their reactions and to make further suggestions.

In addition to the lists of critical tasks and the lists of technical competencies, the report includes a series of tables. On the left margin are the identification numbers for the competencies. Across the top are the code numbers for the various jobs. Within the cells are check marks. "Common cores of competencies for jobs of a similar nature" are identified by using these tables.

Task Analysis Design Problems

The three studies just reviewed have a number of common characteristics. These similarities are found in most other studies which are concerned with determining the demands to be made upon workers as the basis for developing instructional objectives. Because studies of this type are essential in cooperative vocational program development and because many more are needed, the following comparisons and contrasts are presented. The purpose is not to criticize the three studies reviewed as examples, but rather to highlight some of the problems and difficulties encountered in this type of research. In the following paragraphs, six characteristics are identified with comparisons, contrasts, and pertinent observations.

First, all three studies are oriented to occupational clusters rather than to specific jobs. Apparently the concept of "job analysis" which was prevalent in earlier decades is not as widely used in current studies. Second, direct and objective observation (which is the fundamental data source in "job analysis") was not used. It is assumed that questioning the workers, their supervisors or "experts" is a practical and proper method for obtaining data. Questionnaires, patterned interviews, or card-sort instruments are developed first in "laundry list" form. The intuitive judgment of advisory groups, juries, or other respected authorities is used to validate and revise the instruments. A third characteristic of these studies is the inclusion of a procedure for identifying or deriving common learnings which are assumed to be important for all the jobs, occupations, or careers in the cluster. Fourth, in all these studies tasks are identified first, as the basic components of the job, occupation, or career. It is assumed that a list of the tasks performed by the worker is only input data; that some transformation or derivation procedure is necessary to produce appropriate instructional objectives. Fifth, the production of instructional objectives typically involves intuitive judgment of advisory groups, juries, or other respected authorities. The sixth common characteristic is the expectation that the instructional objectives will encompass the full spectrum of manipulative, intellectual, social, and attitudinal demands of the career or occupation.

With the above general characteristics and considerations in view, the key problems and difficulties encountered in this type of research appear to be related to the following questions:

1. Are the occupational clusters appropriate? Are they homogeneous enough to have a substantial "common core" of essential learnings? Are they diverse enough to avoid the disadvantages found in narrow job specialization?

2. Can the responses of the workers, their supervisors and "experts" in the field be accepted as accurate and complete? Does the data obtained from them tell the whole story with respect to the manipulative, intellectual, social, and attitudinal demands of the occupation or career?

3. Are the data gathering instruments and techniques effective and efficient? Are they valid and reliable? That is, were they developed without relying heavily on intuition and guesswork?

4. Is the task data easy to analyze? That is, can it be effectively used to derive or produce instructional objectives using direct, logical inference (as opposed to intuitive inference and guesswork)?

5. Is the procedure for developing the "common core" of learnings one which relies on direct, logical inference?

6. Are the data processing procedures efficient and effective? More specifically, is the research product in a form that can be easily used by curriculum developers and teachers? Are the advisory groups, juries, and respected authorities able to make valid, reliable judgments as they process the data?

If the above questions were used as evaluative criteria, none of the studies found in this search and review would obtain a perfect score, or even a very high one. It appears that these are difficult criteria to meet, given the ambitious nature and scope of these projects. If the researcher were to orient his efforts more narrowly, to a single occupation or job (instead of a cluster, an entire industry, or a galaxy), and if he were to be content to deal with data which can be obtained by direct observation (as in the traditional job analysis approaches), and if he were concerned with developing instructional objectives only at the lowest levels of manipulative skills and knowledge, then the above criteria might be met more easily. But the research product might not satisfy modern demands.

Therefore, as comparisons are made among the Allen, Ertel, and Crawford studies, it is with full recognition that none of the three undertook an easy task. It should be noted that while the Allen study, involving the aviation mechanics occupation, was apparently the "tightest" or "cleanest," as a research design expert might say, it also might be viewed as the easiest task of the three. The spread or comprehensiveness of the aviation mechanics occupation, as a cluster, is not so great; the proportion of tasks which require manipulative skills, factual and conceptual learnings is greater; the transformation of task data to instructional objectives might be viewed as being more easily accomplished with direct, logical inference.

In contrast, the Crawford study was oriented to a very wide and diverse "cluster" of occupations. Seventy-six jobs were included. They were selected from seven industrial classifications: department stores, variety stores, hotel/motels, food stores, automotive service stations, restaurants, and wholesale enterprises. Also, the proportion of tasks requiring manipulative, factual and conceptual learnings is smaller in many of the distributive occupations. Finally, the problem of determining "what it takes" to accomplish many of the common distributive tasks, is obviously quite difficult, requiring the researcher to accept expert judgment and intitution (as opposed to direct logical inference) as the best available method of deriving instructional objectives.

Below are a few tasks selected to illustrate this problem, showing how some tasks may be more easily analyzed than others. The top sets of examples are taken from the Allen study, the bottom sets from the Ertel and Crawford studies. The examples at the left illustrate the types of tasks which appear to relate to physical objects which can be manipulated, described, measured, and where the task can be reduced to a reliable step-by-step procedure. The tasks listed on the right involve psychological constructs or personal qualities (ethics, integrity, analytical skill, tact, etc.). They relate to people rather than to physical objects, where manipulation, measurement, and precise description are more difficult and less reliable.

Easy to Analyze	*Difficult to Analyze*
Identify types of welded joints.	Employ ethical practices in personal conduct.
Fabricate tubular structures.	Perform job estimating.
Weld aluminum.	
Keep display fixtures clean.	Determine customer wants and needs.
Set advertising schedule.	Adjust customers' complaints.
Gift wrap customers' packages.	Interview job applicants.

The point of contrast is that in the Allen study, which deals with aviation mechanics, it appears that a larger proportion of the identified tasks are easy to analyze because they require overt, observable performance. The distributive occupations studied by Ertel and Crawford include many critical tasks which appear to be more difficult to analyze because what happens is not easily observed, even by "experts."

An important aspect of this distinction is that analysis of essentially manipulative tasks requires less reliance on inference and intuitive judgment. Also, the "inferential gaps" are not so large as they are when intellectual behavior is analyzed. More intuitive judgment is involved in determining the essential steps in the procedure or process, in determining what the worker must know, what skills and abilities he must have, and what personal qualities and attitudes are required to perform the task effectively.

On the basis of this review, it appears that whenever a task analysis approach is used with tasks requiring motor skills and factual knowledge, validity of the resulting objectives is apparent and the relevance of the

instructional objectives to the development of teaching-learning strategies is obvious. But when the specified tasks require high level intellectual skills and attitudes, the task analysis procedure results in a less usable product. Examples of such tasks are rare in the Allen study but are found in profusion in the Ertel and Crawford investigations. If more appropriate analytical tools are not available, the researcher is left with the alternatives of accepting the wider inferential gaps or being content to build an instructional program based on the fragmentary data that remains if tasks which do not lend themselves to easy analysis are neglected or ignored. This point receives broader emphasis in the concluding chapter.

Another problem common to the three studies reviewed above is that of dealing with a large volume and great variety of output data. Because of this problem, interpretation and synthesis of the data are critical. Systems for multidimensional classification and proper data processing techniques are essential to insure effective communication of the research project.

The Allen study illustrates a research design and procedure which appears to be unusually effective in dealing with the problem of a multitude of output items while the Crawford and Ertel studies were found to be less effective. The following discussion is an attempt to highlight some reasons for this contrast.

A comparison of the data collection procedure and input instruments of the three studies reveals that all are long, requiring the respondent to produce a large quantity of very specific, detailed information. However, the Crawford and Ertel questionnaires are very simple, asking for a single response for each listed task while the Allen questionnaire is comparatively complex and asks for multiple responses regarding each listed task.

After processing the data produced on these long, detailed questionnaires, the Crawford and Ertel studies present great quantities of information, essentially unprocessed. To illustrate, pages 337 to 1187 of the Crawford project report are devoted to the presentation of findings, lists of critical tasks and technical competencies. The findings of the Ertel study are reported as a list of hundreds of tasks, indicating percentages of respondents who reported performing each one. The Allen study reports findings in 32 tables with a one-page summary and interpretation for each table. A relatively larger portion of the 235-page document is devoted to synthesis, interpretation, and recommendations.

One reason for this contrast is obviously the data processing procedure. The Allen study employed an unusual, sophisticated input instrument coupled with a carefully designed computer program to produce output which was literally "untouched by human hands." The Ertel study employed the computer only for frequency counts and percentage calculations while the Crawford study was limited to analysis which could be performed within the resources of the project, without the aid of electronic data processing.

Another characteristic of the Crawford study which compounded the problem described above is the ambitious objectives of the project. It should be noted that the primary purpose was not simply an analysis of distributive occupations. This was an essential part of the project, but the major

objective was to develop a competency pattern which could be used to design a teacher education curriculum built on the assumption that the teacher-coordinator should be technically competent in a broad array of distributive occupations. Perhaps a less comprehensive design might have been used if the analysis of distributive occupations had been the fundamental purpose. However, there are so many concurrent, intertwined and interdependent sub-projects, and so many multidimensional classifications, that describing the project and reporting the findings present some immense communication problems.

The Ertel study takes a somewhat smaller perspective, being concerned with only three closely related industrial classifications: department stores, variety stores, and general merchandise stores. Also, both Allen and Ertel refrained from identifying tasks with specific jobs. The Allen study considered only one job classification in four very similar industrial settings. The point of contrast here is in the comprehensiveness and scope of the occupational groups which were "clustered" for the purpose of identifying "common learnings." Achieving an optimum balance of homogeneity and diversity in the occupational groupings appears to be essential if task analysis research is to produce usable results.

This concludes the discussion of the three task analysis studies. The purpose has been to show some of the common design features, and to identify some of the inherent problems with this type of research.

Occupational Analysis Studies

To complete the review of studies concerned with performance requirements in the work environment, two additional studies are described below, and reference is made to two studies reviewed in earlier chapters. Not all these studies employ the task analysis design described earlier, but they conform to the broader occupational analysis concept.

Carmichael (1968, 3.b.) studied "middle management" personnel in retailing using a questionnaire containing 202 statements that describe selling, sales promotion, buying, operations, and managerial activities. The activities are ranked according to crucialness to success on the job by 701 retail employees. This activity list bears a remarkable resemblance to the lists of tasks found in the Crawford and Ertel studies. Through a procedure involving the tabulation of frequency of occurrence of the activities, a "common core" of activities described as crucial to success of retail middle managers was developed. The common activities were found in various types of firms, levels of management, and in a variety of job types.

A study reported by Clark (1966, 3.b.) deserves attention here because it is a good example of simplicity and brevity in the design and reporting of task analysis research. It can serve as a model for small scale projects where sophisticated analytical procedures are not feasible. The 10-page report is titled "Vocational Competencies Needed for Employment in the Agricultural-Chemical Industry in Michigan." This study is one of a long list of similar efforts, each oriented to a specific off-farm agricultural in-

dustry. A summary of research findings in this area (Taylor, 1965, 1.) is available for the reader who might wish to have additional information on this topic.

A distinctive feature of the research conducted by Clark and his associates is its orientation to a single industry, with a focus on the essential functions, rather than on specific occupations or jobs. A function is defined as "something that is done at one or more points in the total industry and that is essential for the successful operation and performance of the industry." In the agricultural chemical industry Clark indentified nine functions: research, transportation, processing, public relations, sales, service, office records and management, maintenance, purchasing. It is interesting to note the similarity between this list of functions and the competency areas used in the Crawford study (selling, advertising, display, merchandising, operations and management, product and service technology, social skills, and basic communication skills). As in the Crawford study, the product is a list of tasks (called "competencies" by Clark) associated with each function.

The procedure for the Clark study was to first develop a tentative list of functions (using "expert" judgments), then validate the list through interviews with industry representatives. For each of the functions indentified, competencies assumed to be essential for successful performance of the function were listed. Again, the list was validated by representatives of the agricultural chemical industry in Michigan. Finally, each competency was placed on a small color coded card according to function. The cards were sorted by the industry representatives, to indicate relative importance of the competencies.

An interesting feature of the functional analysis approach is that it results in occupational clusters which are defined by a single industry. Clark makes the assumption that individuals will specialize in some functional area and that training programs should be designed accordingly. But the traditional boundaries of the vocational disciplines are disregarded. To illustrate this point, a few of the competencies from the Clark study are listed below. Note how they naturally fit within the various vocational fields.

Distributive:
- Develops and designs promotional sales programs.
- Sells directly to customers across the counter.
- Determines purchase price based on market reports, etc.

Business and Office:
- Helps to maintain complete and accurate record files.
- Establishes systems for collecting accounts receivable.
- Applies modern principles and concepts of accounting.

Trade and Industrial:
- Maintains electric motors, belts, and drives.
- Makes simple electrical wiring installations.
- Makes minor repairs on delivery trucks and similar equipment.

Agricultural:

Samples and tests products for conformity to specifications.
Keeps in touch with research in area of agricultural chemicals.
Explains agricultural policy information.

Additional assumptions of the functional analysis approach are that all occupational levels are included in the cluster, with the student building his career within the industry as he moves from entry level to the technical and professional levels; and that occupational experience is an essential component of the training program at all levels.

To conclude this chapter two studies which were reviewed earlier are considered again. The Teel investigation (1967, 3.a.) included a "job analysis" based on interviews with experts in the marine sciences technologies. The product was a long list of tasks which look very much like those produced in the Allen study of aviation mechanics. Also, a list of "common skills" in which all the technicians were expected to be proficient, was developed. Instead of developing, or even mentioning, "objectives" as such, the list of specific jobs performed by the technicians was used as the basis for identifying courses to be offered. This illustrates the situation found in many academic programs, especially in higher education. Specific statements of instructional objectives are simply not produced. This does not necessarily mean that they are not understood, however. The objectives are apparently communicated by implication when the instructional strategies, tactics, and content are spelled out.

Finally, the Bushnell study report (1963, 2.a.) concerned with the journeyman electrician included a chapter devoted to the determination of the course outline. The steps in the process were a "task analysis," specification of knowledge and skill requirements, determination of what the students expected from the training, development of instructional objectives, with the course outline as an end product. As in the previous examples, interviews with key people were the major data sources.

An important point of contrast between the Bushnell study and those reviewed earlier in this chapter is in the form of the final product. There are no long lists. The specific tasks involved in the "task analysis" are not reported. The knowledge and skill requirements are presented as 10 short sentences (which look like statements of broad objectives) such as: "A thorough knowledge of symbols and conventions used in electric wiring and schematic diagrams," and "An ability to use electrical test equipment and to interpret the readings of the instruments." The course objectives are presented in very broad terms such as assisting the journeyman electrician "to improve his job performance." The course outline includes 15 specific topics such as "fundamentals of electrical circuits," "the sine wave" and "the transformer."

The relative merits of dealing in general terms, as exemplified by the occupational analysis phase of the Bushnell study, as compared with the much greater detail found in studies such as those reported by Allen and Crawford, is briefly discussed in the concluding chapter. It should be noted

here, however, that Bushnell makes a strong case for very careful and proper determination of the goals of the program in terms of "knowledge and skills expected of the trainee at the conclusion of the course." In fact, this rationale is often used to justify the development of extensive compilations of very specific objectives stated in terms of measurable performance.

IV

RESEARCH FOCUS: EDUCATIONAL TECHNOLOGY

Chapters II and III were each developed to correspond to one of the three components of the "continuing investigation" as illustrated in Figure 1. The computer search of the ERIC collection and the somewhat limited search of professional literature produced a substantial number of research reports which were used as the basis for the development of the two preceding chapters. This chapter and the one which follows cannot be tailored to fit the theoretical model so neatly because the search procedure did not produce a well-ordered package of research reports to correspond with the remaining components of the model. This chapter includes a review of those studies which were found to correspond to the "education" component. Chapter V includes reviews of the research reports which were logically related to the portion of the model concerned with "program implementation."

The first part of this chapter deals with the procedures, products, and problems of research to determine instructional objectives and content. This topic is an extension of the last portion of Chapter III. Following will be a review of selected items of research concerned with teaching and learning, the techniques and procedures employed as the "strategy, tactics, and plans" in cooperative vocational education program development.

Deriving Objectives from Task Analysis Data

The last portion of Chapter III included reviews of several studies designed to determine by occupational analysis what students should learn as they prepare for the employment situation. A fundamental assumption in all of those studies was that information about the demands to be made upon the worker-to-be are important in determining what the student should learn. That information, usually in the form of a list of tasks, was used to derive the instructional objectives. The following few paragraphs are devoted to a continuation of the earlier reviews, showing how the task analysis data were used and describing the final products of these studies.

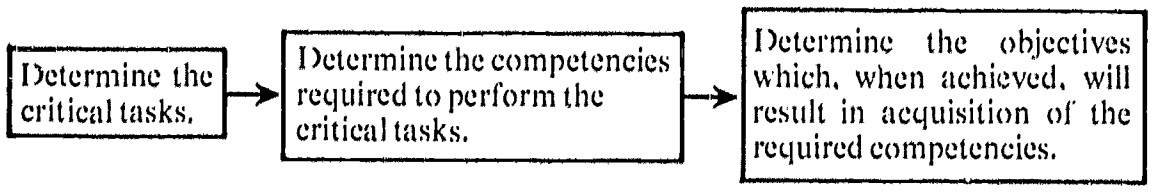
Crawford (1967, 3.b.), Ertel (1967, 3.b.), and Carmichael (1968, 3.b.) assumed that derivation of instructional objectives was a separate activity, presenting the task lists as the products of their research. Allen (1966, 3.b.) and Bushnell (1963, 2.a.) included the development and presentation of

content outlines as part of their project reports. Teel (1967, 3.a.) and Clark (1966, 3.b.) did not produce statements of specific objectives, but made recommendations about the nature and content of courses to be offered.

As mentioned earlier, the Ertel study was viewed as the first step in producing "task and knowledge clusters" of importance in general merchandise retailing. The final phase of that project had not been completed at the time of this writing. Apparently Carmichael expected that his study would be used by program developers to derive their own instructional objectives. The instructional objectives of the Bushnell study were presented as very broad statements, with a topic-by-topic outline of instructional content serving to communicate what the students were expected to learn. Allen does not refer to objectives or goals of instruction, but presents a topic-by-topic outline of a "core curriculum" for the aviation mechanics occupation.

Essentially, the specific sub-topics, which Allen calls "behavioral tasks" are those tasks which were found to be important enough to be included in the "core." Therefore, there is no difference in form or meaning between the statement describing the task and the curriculum sub-topic. Tasks, objectives, content descriptions - all are identical in form.

The theoretical basis for development of instructional objectives is slightly different in the Crawford study, which uses the "competency pattern approach." The procedure can be summarized as shown below:



The previous chapter includes a description of the portion of the Crawford study (1967, 3.b.) which was devoted to developing the lists of tasks and competencies. In what might be viewed as a separate project, Crawford (1969, 3.b.) produced a statement of the "technical objectives" which were derived on the basis of the 1967 research findings. The procedure for translating the task analysis data into statements of instructional objectives involved two steps. First, the statements of the objectives were written by the research project staff. These statements were then submitted to specialists who suggested changes in wording and indicated their assessment of the appropriateness of each stated objective.

The resulting objectives appear to be very similar to the critical tasks and required competencies on which they were based. Main headings are apparently identical in form to the statements of competencies (which are essentially the same as the statements of critical tasks). Under each main heading, which is identified as the "terminal or ultimate objective" is found a list of "enabling objectives." The assumption here is that for a given task there might be a number of related objectives, each contributing an essential element to the total competency. The reverse logic appears to be applicable, since the list of objectives is much shorter than the list of tasks and

competencies which were used as input data. In this case, the achievement of a given objective might result in the development of a number of related competencies.

One doctoral study was found which was unusual in that it was concerned only with the derivation of instructional objectives (Petro, 1969, 3.b.). An earlier doctoral study (Ozzello, 1967, 3.b.) was used as the source of task analysis data. The student clientele was assumed to be two-year college students preparing for accounting technician careers. Petro selected 35 accounting tasks (called "activities" in his study) such as maintaining a sales journal, computing overtime payroll, making manufacturing expense schedules, and preparing income statements. These tasks were assumed to be "representative of the larger set of technical accounting activities identified by Ozzello." (Ozzello identified 250 activities.)

An unusual feature of the Petro study is the procedure for derivation of the objectives. Employing a concept similar to the "enabling objectives" model found in the Crawford study, Petro "fractionated" each activity (using his own intuitive judgment) into "concepts, skills, and operations." Then flow diagrams were prepared, one for each of the 35 tasks, showing the interrelationships of the component concepts, skills, and operations. Finally, instructional objectives were written on the basis of the flow diagrams. Expert judgment, in this case using a jury panel of accounting instructors, was used to validate the objectives.

The resulting list of objectives is presented in what appears to be a very usable form. Each "task demand statement" is identified with a group of instructional objectives which "should be achieved in order for students to demonstrate the terminal behavior" associated with the task. For example, six objectives are identified with the task of "making a balance sheet." Each objective is presented as a statement in three parts. First is a description of the learning situation or of what the student is given to work with. Second is a statement regarding what the student will be able to do. Third is a statement about how performance capability might be judged or evaluated. This system appears to be much like one described by Allen in his presentation of "teaching levels" and "testing levels" in the study of the aviation mechanics occupation.

Allen used the Bloom and Krathwohl hierarchy (1956, 1. and 1964, 1.) while Petro used the Gagne (1965, 1.) approach. Allen, however, designed his questionnaire to determine "teaching and testing levels" directly, while Petro relied on intuitive judgment.

Thus, after considering the various approaches to developing instructional objectives on the basis of an investigation of the employment community, the identification of tasks appears to be the fundamental and essential research activity. While a variety of procedures are used in processing the task analysis data, no procedures were found to rely on sophisticated statistical manipulations, no procedures were found to produce a substantial transformation of the task analysis data as instructional objectives are derived.

Instructional Content

The search of the ERIC collection produced a number of items which could not be considered as "research" but which were essentially concerned with what cooperative vocational students should learn. Dozens more could be quickly identified on the shelves and in the files of most vocational directors, teacher educators, and others associated with cooperative vocational education. Classification and tabulation of the items which appear in the bibliography category titled "Instructional content and Materials" revealed that over three-fourths were produced in the fields of agricultural education and industrial education as study guides, workbooks, curriculum materials, and the like. A few similar items were found in the areas of business and office, distributive, and health occupations. Some were found to be concerned with career development and work adjustment and some were oriented to the educable mentally retarded. A few typical examples will indicate the nature and variety of these documents. These are not actual titles, but only descriptive phrases used to identify the items in the classification.

"Curriculum materials for high school agri-business programs."
"Programmed instruction land judging and plant nutrition."
"Study guide auto body and fender."
"Study guide cooperative program in barbering."
"Model business education curriculum."
"Course of study eleventh grade cooperative program, medical records."
"Guidelines for group discussions on work adjustment mentally handicapped."

It should be noted that only a few of the many documents concerned with instructional content and materials are found in the ERIC system, and certainly it should not be assumed that this document search produced a significant portion of those that might be found if other descriptors had been used.

Some of the curriculum guides, course outlines, and other such materials include statements of instructional objectives, others do not. It is obvious, as one reviews these materials, that in some instances a great amount of effort and expertise have been utilized in the development of objectives and determination of content to be taught. If the procedures had been described and a research framework employed, some of the "curriculum guides" might have been presented as research reports. Also, there are a few items which appear to have been developed without much awareness or concern about the demands of the work situation.

The impression one retains after reviewing this assortment of documents is that there are very few cases in which it can be shown that the instructional objectives and program content are solidly based on the kind of research that finds acceptance in the academic community. On the other hand, there are many examples to be found, where the experience and good

judgement of experts in the employment community have been well used in the development of instructional objectives and program content. No convincing evidence was found to support the notion that a formal research procedure produces more appropriate or more valid objectives than those which appear to be produced by "arm-chair" procedures, since expert judgment is usually the main ingredient in both cases.

Teaching and Learning Research Design

Having considered research about what should be taught (or more properly, what should be learned) in cooperative vocational education, we now turn to another important component of educational technology; the question of how to teach (or more properly, how to facilitate learning).

In the introductory comments it was pointed out that very little research has been found to be directly oriented to the methodology of work-related education as a system or strategy. In this search, four doctoral studies were identified, each comparing a typical cooperative vocational program (as a whole) with another instructional system that might be viewed as an alternative approach (Bobbitt, F., 1969, 5.; Ferguson, 1967, 5.; Rowe, 1969, 5.; Saunders, 1967, 5.).

A number of other projects were found to relate very directly to instruction in cooperative vocational education even though the cooperative method may not have been employed. Many more might have been found if the search had duplicated the efforts of others who have completed review and synthesis projects in the various areas of vocational and technical education.

Since the specific tactics or techniques applied in typical classroom situations are often appropriate for instruction in cooperative vocational education, we find many other sources of relevant research-based information in the professional journals of the educational community as a whole. A relatively new journal, *Educational Technology* promises to be a fruitful source. Also, a recent article in the *Review of Educational Research* (Householder, 1968, 5.) offers a brief review of studies concerned with techniques and modes of instruction in vocational education, with a bibliography of 83 items.

Research concerned with teaching and learning technology, according to what was found in the studies reviewed for this project, appears in one of three characteristic designs. The studies listed in Table 2 are examples of the most common design. The basic procedure is to identify two or more groups of subjects, usually students. One group serves as a control group and is given some traditional form of instruction to provide a base for comparison. One or more groups serve as experimental subjects, receiving instruction by some method or technique which is under investigation. Usually pretests are given, then the experimental and control groups are subjected to an instructional treatment, after which post-tests or other assessment techniques are employed. Differences in achievement, as measured by the apparent

differences in test performance, are taken as evidence of differences in the effectiveness of the innovative technique or procedure as compared with the traditional approach.

TABLE 2

STUDIES COMPARING TEACHING-LEARNING TECHNIQUES

Teaching-Learning Techniques	Instructional Content	Student Subjects	Reference
Individual Self Instruction vs. Lecture-Discussion	Specific Related Information in Distributive Ed.	High School Distributive Ed. Students	Robertson 1967, 5.
Standard Programmed Instruction vs. Enriched Programmed Instruction vs. Programmed Instruction on How to Learn Plus Traditional Instruction	Technical Business Vocabulary	High School Office and Distributive Ed.	Lanham 1963, 5.
16mm Sound Film Plus Group Discussion vs. Lecture-Discussion	A Series of Teacher Training Lessons	Potential Instructors (Craftsmen)	Pratzner 1969, 6.b.
Individual Self Instruction With Tradesman as Monitor vs. Individual Self Instruction With Professional Teacher vs. Conventional Instruction	A Series of Lessons in Electronics	Adult Vocational Training Program Enrollees	Bushnell 1963, 2.a.
Individual Self Instruction with Telecture vs. Individual Self Instruction Only	A Series of Lessons on Interaction Analysis	Public School Teachers	Kennedy 1969, 6.b.
Management Simulation (Business Game) vs. Lecture-Discussion	Basic Concepts of Pricing and Profit Analysis	Two Year College Business Students	Ashmun 1966, 5.
Cartridged Sound Films for Individual Instruction vs. Group Demonstration and Lecture Plus Individual Practice	Business Machines Operation	Two Year College Business Students	Edwards 1969, 5.

A second type of investigation is illustrated by the studies presented in Table 3. The basic design and procedure are the same as that described in the paragraph above except that instead of dealing with a single tactic or component of an instructional system, the entire system (or broad strategy) is under investigation.

The third type of investigation is like the second in that an instructional system or program is under investigation, but the orientation and concern of the researchers is not necessarily upon the system itself. Rather, they are interested in demonstrating the feasibility of the system (or, perhaps, any system) in achieving certain objectives with a certain student clientele. Typically, the study is designated as an experimental or pilot project to determine (or demonstrate) the value of an instructional system for the specific student group. Presumably, if the system under investigation is shown to be ineffective, some other system would be attempted as a means of achieving the predetermined goals with the same student group. While a pre- and post-test system may be employed and a traditional program may be used for comparative purposes, the typical pattern is to simply evaluate the effectiveness of the system using the usual program evaluation procedures. If the results "look good" as judged on some rational basis, the experiment is viewed as "successful."

TABLE 3

STUDIES COMPARING INSTRUCTIONAL STRATEGIES

Instructional Strategies	Student Subjects	Reference
Traditional Cooperative Vocational Program With Released Time for Student Employment vs. Cooperative Vocational Program Without Released Time for Student Employment	High School Students in Off-Farm Vocational Agriculture	Bobbitt, F. 1969, 5.
Traditional Cooperative Vocational Program vs. The Preparatory Vocational-Technical School	High School Students in Various Occupational Areas	Sanders 1967, 5.
Traditional Cooperative Vocational Program vs. Project Training Program Without Coordinated Concurrent Employment	Distributive Education 11th and 12th Grade Students	Ferguson 1967, 5. Rowe 1969, 5.

Some of the research reports that were found in our search of the ERIC collection, which logically fit the above description of pilot and experimental or demonstration project reports are listed in Table 4. As an aid to the reader in visualizing the nature of these projects, brief descriptions rather than full titles are used. For convenience, these items are listed separately in the bibliography. It should be noted that typically these projects are designed to determine or demonstrate the feasibility of a particular instructional system in achieving a particular set of objectives with a particular student clientele. Many of these projects utilized on-the-job or sheltered workshop training, but the extensive review and synthesis that would be required to extract information that would be of value here, was simply not possible with the available resources and time.

It should also be noted that a fourth general design which is very similar in many respects to the pilot or demonstration project, is that used for the typical program evaluation. Program evaluation studies constitute the largest group of research reports found in the search of the ERIC collection and in *Dissertation Abstracts*. These studies are considered in the next chapter.

The reason for the above descriptions of the various types of studies is to call attention to the fact that many of the research projects in the vocational and technical education areas are concerned with demonstrating the feasibility, effectiveness, or relative merits of a specific instructional technique, a larger instructional system or a total program. Altnough not many of those studies are described in this chapter on educational technology, the reader should be aware that many of them have implications for teaching and learning in cooperative vocational education.

Comparing Instructional Methods

In the two previous chapters, several studies were identified as exemplary and reviewed in detail so that the reader might visualize other applications of the research designs. Because more comprehensive review and synthesis project reports are available, the presentation in this chapter does not follow that pattern. This is not to say that these research reports were not reviewed. The problem is that not many exemplary investigations were found in these few (apparently typical) research reports.

To be specific, of the 12 studies reviewed, only three found any "significant differences" between the traditional or control treatment and the innovative or experimental techniques. This oversimplifies and somewhat misrepresents the findings of these studies, and brief reviews are presented below to show a more accurate picture. But the typical problem, or frustration, is well expressed in the summary and discussion section of one of the research reports (Kennedy, 1969, 6.b.):

> The obvious conclusion emanating from this research effort was that the effectiveness of the inservice self-instructional program could not be verified on the basis of criterion variable analysis. This study, therefore, joins the ranks of the vast majority of investigations which

TABLE 4

EXPERIMENTAL PILOT AND DEMONSTRATION PROJECTS

	Educable Mentally Handicapped Youth
Nicolaysen, 1965, 4.b.	Groundsman-gardener summer training programs
Harvey, 1963, 4.b.	Special class curriculum and environment and vocational rehabilitation
Greenstein, 1966, 4.b.	Occupational training center project
Crump, 1966, 4.b.	Vocational rehabilitation and other secondary level education and vocational training experiences
Eddy, 1966, 4.b.	Vocational instruction using the cooperative work-study program. Evaluation of program presented as Part II
Bitter and O'Neil, 1967, 4.b.	Project through work experience center
Georgia State Department of Education, 1966, 4.b.	Coordinated program of special education and vocational rehabilitation
Devereux Foundation, 1964, 4.b.	Residential treatment center program for vocational rehabilitation
	Culturally Deprived, Disadvantaged Youth
Mitchell, 1965, 4.b.	Summer residential education project
Shrank and Lorber, 1964, 4.b.	On-the-job training program
Illinois State Board of Vocational Education and Rehabilitation, 1966, 4.b.	Cooperative supervised job training program
Gillie, 1967, 4.b.	Two-year general technology program
Rhodes, 1968, 4.b.	Educational cooperative program in Appalachia (Proposal)
	Drop-outs
Kaplan, 1967, 4.b.	Occupational training center program for 16-18 year olds
Manzanares and Barnes, 1966, 4.b.	Vocational core program for junior and senior high youth

TABLE 4—Continued

Office of Education Connecticut State Department of Education, 1967, 4.b.	Educational and occupational training center program for youth
Jeffery, 1967, 4.b.	Social and educational rehabilitation program utilizing reinforcement method
Canadian Department of Citizenship and Immigration, 1967, 4.b.	Program for training and motivation of adults
Seattle Public Schools, 1967, 4.b.	Modified Job Corps program for youth providing education and part-time employment (Proposal)
	Youthful Offenders, Delinquents
McKee, 1967, 4.b.	Training and placement project
Sullivan and Mandell, 1967, 4.b.	Vocational training project
	Adults
Kaufman, 1966, 4.b.	Cooperative community action project for training, retraining, and employment
Women's Talent Corps, 1967, 4.b.	Training of women in poverty areas for community service positions
Georgia State Department of Education and Department of Health, 1964, 4.b.	Vocational rehabilitation of mental patients through a total psychiatric care program
Stevens, 1967, 4.b.	Agricultural education program for farmers through on-the-job and classroom instruction
	General
Brown, 1968, 5.	Short-term intensive training of high school seniors for entry level clerical and retail sales jobs
Minelli, 1965, 4.b.	Industrial-technical education project for university, community college, and high school levels (Proposal)
Chandler, 1967, 4.b.	Counseling and instruction project in mechanics, applied electronics, and office occupations for grades 11-14
Ramey, 1967, 4.b.	Programs and services of rural Kentucky vocational school

> have attempted to assess the differential effectiveness of teaching methods and which have been able to report only "nonsignificant results." Greater confirmation is thus afforded the emerging tenet that it is extremely difficult to empirically demonstrate that one method of instruction is better than another.

The kind of frustration described above is shared by the practitioners in the vocational-technical community. This is illustrated by an incident that occurred as this chapter was being written. An eminent person called long distance to ask if any substantial research had been discovered to document and support the value of the cooperative method in vocational education. Ironically, this individual had been contacted earlier as one of about a dozen key people in the vocational-technical education community, all of whom had indicated that substantial research evidence probably could not be found.

Two of the studies comparing teaching-learning techniques (Table 2) produced "significant differences." Both utilized motion pictures with sound as the main element of the experimental treatments. Pratzner (1969, 6.b.) presented a series of teacher training lessons to craftsmen who were viewed as potential instructors in industrial education programs. Each lesson included a one hour seminar discussion on the content of the film lesson. "The control treatment consisted of a face-to-face, integrated lecture-discussion of essentially the same content." On the basis of performance on written achievement tests it was found that (as a group) those who had viewed the film learned more ($p < .038$). Both groups liked the experience and "felt that the course was of value to them."

A doctoral study by Edwards (1969, 5.) is the other case in which statistically significant differences were found. "The problem of this study was to determine whether the particular office skill of business machines operation could be as effectively learned from filmed demonstrations viewed individually in an unstructured, open-laboratory situation as from a traditional classroom method and environment." Two community college business machines classes (randomly divided) were used as experimental and control groups. "The control group met at the regularly scheduled times, receiving instruction by the traditional, rotation-plan method. The experimental group received its instruction individually in carrels from the prepared films viewed on a rear-screen projector." The students were permitted to view the films at their convenience, checked their own work and saw the instructor only when they took the initiative to do so.

At the end of the 10 week term both groups took an identical final examination, and the students who had viewed the films completed a questionnaire about their impressions of the experience. "The great majority of experimental-group students had a favorable attitude toward the experimental process." Test score differences (comparing the mean scores of the two groups) indicated that the students using the audio-visual-tutorial method learned more ($p < .025$).

Another study using two year college business students as subjects (Ashmun, 1966, 5.) employed a management simulation (business game) without a textbook or lectures, to teach basic concepts relating to pricing and profit determination. The simulation was not the sophisticated computerized type with many interacting variables (such as are found in university business courses). The students worked in small groups, attempting to manage the purchase and price determination decisions related to two items of merchandise (watches) in a jewelry wholesale business. The control groups worked in the traditional ways, in a lecture-discussion situation, to learn the same concepts and procedures as those required in the simulation.

No statistically significant differences were found in the factual and conceptual learnings but students apparently enjoyed the simulation activities and felt that their "business sense" had been enhanced. Therefore, the Ashmun study might be viewed as supporting the use of business simulation activities instead of the traditional topic-by-topic methods of teaching basic business concepts. It would have been interesting to see the results of some assessment procedure to determine if the students taught by the simulation method retained the learnings longer and if they were more capable of applying the utilizing the learnings in everyday business employment situations.

The remaining four studies used some form of individual self instruction or programmed learning as the experimental treatment. Kennedy (1969, 6.b.) was concerned with the added benefit or effect of a taped "telelecture" compared with the individual self instruction materials alone. No differences were found. The discussion of findings is mainly devoted to an analysis of what went wrong or why the findings might not have been an accurate reflection of the value of the added television presentation.

Lanham (1963, 5.) in a much more complex research approach, found no differences between experimental and control groups. One objective was to test the postulate that injecting very interesting subject matter (called "motivational materials") into a standard program of self instruction might enhance the motivation and, therefore, the desire to learn what might be considered as dull and uninteresting material. The material was the technical vocabulary related to the commercial letter of credit. The enrichment material consisted of colorful illustrations, extra drawings to illustrate certain points, humorous illustrations and cartoons, etc. One finding was that the "motivational materials" were not very interesting after all.

Another objective of the Lanham study was to investigate the effect of teaching the students (through a different individual instruction program) how to learn technical vocabulary, then applying the traditional textbook and dictionary usage approach. To summarize (and perhaps oversimplify) the findings of the Lanham study, all three groups learned something, though not enough to satisfy the researchers. All three learning situations produced about the same results. An immediate post-test and another test given two weeks later indicated that the "loss of learning was negligible."

Bushnell (1963, 2.a.) in a comprehensive project to develop and test an instructional system for upgrading the employment skills of journeymen electricians, investigated the relative effectiveness of two ways of using programmed self instruction as compared with conventional instruction to teach the same technical knowledge and skills. One "instructional mode" was viewed as least expensive, the programmed materials combined with a competent tradesman as a "monitor" to supervise the learning situation and answer questions. A second more expensive approach utilized the same instructional materials but utilized a professional teacher and provided for more interaction of the teacher with the student. The control was conventional instruction as found in the typical adult education evening program.

The Bushnell study employed a sophisticated procedure of pre- and post-testing in an effort to isolate the effects of the differences in the instructional treatments. The results were as follows: "No significant differences existed between the three instructional modes; within group variances were relatively large.....Thus it may be assumed that the mode samples were not significantly different....."

A doctoral study by Robertson (1967, 5.) is last in this series concerned with specific teaching-learning techniques. The purpose was not to study programmed learning as in the above studies, but to investigate "the individual study method" of teaching specific related information in cooperative distributive education programs. The traditional method, used for comparison, was the classroom lecture-discussion method. The research design was apparently appropriate, with adequate numbers of subjects, control of factors such as teacher effect, student capabilities, and other variables that often contaminate the findings of this type of research. The abstract of Robertson's conclusions and recommendations included the following: "The informational gain of students taught by the lecture-discussion will not be significantly different from the informational gain of students taught by written individual study assignment sheets." It was found that costs, both financial and in terms of coordinator time, are greater for the individual instruction. Also, Robertson makes a strong point of the need for "more and better specific related information reference and study materials."

Comparing Instructional Systems

The studies listed in Table 3 are similar to those reviewed above in their basic design concepts, but they are addressed to a much larger problem of comparing two instructional systems to determine their relative effectiveness. Four of the five studies (the four which did not produce "statistically significant differences") are directly concerned with cooperative vocational education. All four are doctoral studies.

Sanders (1967, 5.) titled his dissertation as "A Comparison of Two Methods of Preparing Youth for Employment: Cooperative Occupational Education Versus The Preparatory Vocational-Technical School." Instead

of the pretest-post-test experimental design employed in the other studies listed in Table 2 and Table 3, Sanders compared the two methods by gathering and summarizing data from the state department of education records and school personnel files. Questionnaires were also used to gather information from graduates of the two programs, their parents, cooperating employers and current employers. Therefore, this study is essentially descriptive and evaluative, even though comparisons are made. Since it was found that "cooperative occupational education graduates tend to work progressively toward clerical, service and sales occupations, whereas vocational-technical school graduates worked toward skilled and semi-skilled occupations," this study does not compare two methods having the same objectives. It might be assumed that one program was primarily oriented to distributive and office occupations while the other was oriented to the field of trade and industrial education.

Selected items from the summary and conclusions of the Sanders study are:

> Cooperative occupational education graduates were rated higher by current employers on personal characteristics, work habits and over-all competencies than were vocational-technical school graduates.
>
> Vocational-technical school graduates were earning a higher average current salary than cooperative occupational education graduates.
>
> Parents of the two groups of graduates expressed favorable opinions toward the programs in which their child was enrolled.
>
> There were no statistically significant differences between graduates of the two programs with respect to intelligence, percentile ranks, scholastic rank and grade point average.
>
> The major portion of both groups did not enter the occupation for which they were trained.
>
> Many employers who had cooperated with the cooperative occupational education programs looked upon the programs as a source of low cost, part-time workers who may be assigned to perform routine tasks.

Frank Bobbitt (1969, 5.) conducted a study comparing a traditional form of cooperative vocational agriculture (off-farm) with a similar type of program which did not permit the students and coordinators to have released time from school. The research design was developed on the assumption that a thorough description of each program type, considering the attitudes and activities of the participants, could form a valid basis for comparison.

In the section of the report titled "recommendations" following statements are found:

> The responses of pupils, agricultural occupations instructors and school administrators involved in the concurrent work-education model with school released time or in the concurrent work-education model without school released time indicated that there was little

> difference in their attitudes toward non-farm supervised agricultural experience programs. The responses. . . . .indicated that there was little difference in their activities and accomplishments. . . . .It is therefore recommended that both models for obtaining concurrent work-education. . . .be retained as options for teachers to select in order to meet their local situations.

Two additional studies (Ferguson, 1967, 5.; Rowe, 1969, 5.) were designed to compare the effectiveness of cooperative vocational programs with an alternative program type. In the Bobbitt study the alternative was a program which was assumed to be essentially similar except that student employment was after school. Ferguson and Rowe investigated a system which omitted the on-the-job training component entirely and replaced it with a block-time program of school sponsored learning activities called "project training" or "the project method."

The "project method" was introduced to distributive education in 1965 through several speeches and papers presented by Mary V. Marks and Edwin L. Nelson, at various professional meetings. A collection of speeches and papers on the subject (Haines, 1968, 6.c.), presented at a national conference concerned with the "project method" in distributive education, can provide the reader with the theoretical and philosophical framework for this innovative approach. The essence of the strategy "involves a series of selected learning activities or projects.....related to the student's occupational interests." (Crawford, 1967, page 17, 3.b.). "The project method extends classroom instruction into a laboratory environment.....to enrich and enlarge upon understandings and skills developed initially during regular class sessions." (Marks, 1965, 1.).

The purpose of the Ferguson and Rowe studies was to compare the effectiveness of the traditional cooperative program in distributive education with a block-time school sponsored laboratory approach without training stations or training sponsors from the employment community. The Ferguson study was conducted in the state of Michigan and Rowe studied programs in Arizona. The research design, procedures, and findings were essentially similar.

Selected high school distributive education programs were set up as "pilot programs" to provide data. In contrast with the Bobbitt study, where ongoing programs of both types were available for study, Ferguson had to work within the limitation of not having "project method" programs available for comparative purposes. Rowe had only three. Therefore, an important design compromise was necessary. The result, in effect, was to compare regular twelfth grade cooperative programs with eleventh grade preparatory classes.

The only statistically significant finding with respect to the differences in achievement between cooperative and "project" groups was found by Ferguson, with the students in the cooperative programs obtaining higher scores on the tests of sales comprehension. Rowe found no differences on any of the measures.

State supervisors of distributive education were surveyed to determine the extent to which they were using and intending to use the block-time school sponsored laboratory as an alternative to the cooperative method (Wallace, 1969, 5.). Results of the survey indicated that only a few twelfth grade "non-coop" distributive education programs were in operation and very few new ones were anticipated. To quote:

> At this time a majority of D.E. state supervisors are not ready to consider laboratory block-time instruction in situations where effective cooperative programs are feasible. A few, however, vision of a new and potentially more effective instructional system for distributive education. . . . Twenty-five respondents (71%) indicated specifically that the main value of the project method is as a "substitute for the coop method in situations where adequate training stations are not available." Many also suggested that preemployment and preparatory training should utilize the project method in a block-time laboratory approach.

This concludes review of studies concerned with teaching and learning. As mentioned earlier, many more might have been reviewed.

Instructional Strategies Research Problems

Very few research reports provide dramatic evidence about the value of one instructional technique as opposed to another, or of one instructional system compared with others. Some studies are apparently well designed (the studies by Ashmun, Bushnell, Kennedy and Edwards, for example), others are not.

The purpose of this discussion is to highlight for the reader, how very difficult it is to design and conduct "neat, clean, tight" research in this area. Evidence of the problem is found in the great amount of space the researchers dedicate to complaints, excuses, apologies, and the like, as they review, summarize and interpret their findings.

Apparently there are two possible reasons for the frequent failure of research on teaching and learning technology. One is that the technical aspects, the strategies, tactics, media and the like have little real effect on the quality of the teaching-learning experience; that the artistry of the teacher is the single important factor in the situation. More discussion on this point appears in the next chapter. The second possible cause of failure is in the inadequacy of the research technology. Earlier in this chapter the typical design used in investigations of teaching and learning techniques and strategies was briefly outlined. It appears that there are several critical points in that design, where failure and frustration repeatedly occurs. The following comments, which are a continuation of the earlier quotation by Kennedy indicate one typical problem:

> But it must be remembered that the present investigation, among others, was limited in terms of the measures and instruments used to detect behavioral change. The present investigation employed

measures which may not have been sensitive enough to detect change. Or possibly, the "wrong" kinds of questions may have guided the conduct of the research.

One problem, as illustrated above, appears to be that instruments, techniques and procedures are not adequate to measure what should be measured in the pre- and post-test evaluations to determine the relative effectiveness of the teaching-learning methods under investigation.

Another obvious problem is figuring out how to design the study so that uncontrolled intervening variables do not contaminate the findings. Research in the natural sciences has been refined to a stage where experimental investigations are commonplace. But in the human sciences (except where animals are used as subjects, and where "pure" or "basic" research is the order of the day) manipulation and control of the subjects, the environmental factors, etc. is usually difficult if not impossible. The studies which were apparently most successful, investigated a single factor (such as the use of sound films) and were able to provide a teaching-learning situation which was obviously similar for the experimental and control subjects, leaving the experimental treatment as the major difference. When a list is made the many variable factors that are not accounted for in some of the more broadly oriented studies, the extent of the problem becomes more apparent.

V

RESEARCH FOCUS: PROGRAM IMPLEMENTATION

Implementation of the broad strategy and specific tactics of cooperative vocational education includes many activities. In the theoretical model presented in Chapter I, five broadly defined tasks are suggested:

1. Acquisition of the required resources including money to finance the enterprise, facilities, equipment and other material resources, qualified capable people such as coordinators, administrators, guidance personnel, training sponsors, advisory committees, etc.
2. Organizing to effectively utilize the available resources. This includes a complex of activities including the assignment of responsibility and and authority, development of plans, procedures, policies, guiding principles, etc.
3. Program operation, including initial development, the activities required to maintain it and to control it as a functioning system.
4. Evaluation of the effectiveness of the system in achieving the planned objectives, the appropriateness of the strategy, tactics, and plans.
5. In accordance with the findings of the program evaluation, the original objectives, strategies, tactics and plans may be revised or adjusted, improvements and innovations may be adopted.

The search procedure employed in this project produced an assortment of research reports which are reviewed and discussed in the perspective of the broad implementation tasks as delineated above.

Scope and Delimitation

Obviously, a complete review giving adequate attention to the five broad areas would require many projects, employing the specialized talents of a variety of people. More thorough and comprehensive search and review projects oriented to specific aspects of program implementation are obviously needed. Examples of such projects which have been recently completed deal with the application of cost-benefit analysis in vocational education (Warmbrod, 1968, 7.a.), and with program administration (Wenrich, 1969, 7.a.)

The documents selected for review in this chapter are those which seem to relate most specifically to the implementation of cooperative vocational programs. It happens that a relatively large number of studies, mostly doctoral dissertations, were found to be concerned with describing the characteristics of effective teacher-coordinators. Other very important research topics are not so popular. For example, research involving advisory committees, training sponsors, club programs, and teacher education appears to be very rare.

Therefore, the content of this chapter represents an effort to acquaint the reader with a few of the most relevant of the studies which appeared in the ERIC collection and *Dissertation Abstracts,* while drawing material from other sources to provide a more balanced perspective. A majority of the studies found in this area relate to the demands made upon the vocational teacher or teacher-coordinator as he functions in the teaching-learning situation, with the research products appearing as competencies, roles, job behaviors, personal qualities and characteristics. A few studies are related to pilot or experimental projects to train teacher-coordinators and other key personnel. Finally, reference is made to the proceedings of conferences, workshops, and seminars for developing teaching and leadership resources.

After a comparatively extensive review of the studies about the characteristics of effective teachers, very limited attention is devoted to research and literature concerned with program administration and program evaluation. The purposes in these concluding sections are to acquaint the reader with the types of documentary material and research reports which are available, and to provide information to assist the reader who might wish to extend his study beyond what can be presented here.

Artistry of the Teacher

A significant point brought out in Chapter IV was the fact that very few studies comparing the effectiveness of various instructional methods produced evidence of the superiority of one method over another. The difficulty of designing research so as to minimize the effects of uncontrolled intervening variables was cited as a contributing factor. Another possible explanation, however, is that the artistry of the teacher has such a powerful impact on the quality of the students' learning experiences that differences in procedure, technique, equipment, organization, and method are apparently insignificant.

Figure 2 illustrates the notion that many interacting and mutually dependent resources, including the artistry of the teacher, are brought to the teaching-learning situation. Ideally, research effort should be directed to each aspect of the teaching and learning situation, and research reports could be found to relate to each sub-topic and many more. However, not all of the factors identified in Figure 2 are equally suitable as research topics. While the artistry of the teacher may be viewed as a critical factor, substantive research-based evidence is simply not available to show how this resource contributes to effective learning. Manipulation and measurement of the artistic element in the behavior of the teacher is obviously difficult and researchers have oriented their efforts to more manageable (and possibly less crucial) technical factors.

However, a considerable amount of evidence is found to support the notion that the artistry of the teacher is the paramount factor in the teaching-learning situation. Some of it is presented below, as an assortment of opinions. Since some of the more respectable research reviewed in earlier chapters relies on "the intuitive judgment of experts" as a data source, perhaps a similar rationale can be used to justify presentation of the following quotations.

Max Beberman, head of the Curriculum Laboratory at the University of Illinois, speaking at the American Vocational Association Convention, 1967, reflected upon his experiences in the "new math" curriculum development projects:

> Curriculum development is, at this stage in the history of education, a craft and not a science. Curriculum development is something that artisans have to carry out. It is an art, it takes a great deal of craftmanship. . .

John Steinbeck made this point eloquently. The exact source could not be found, but the essence of his message is as follows:

> To have three great teachers in a lifetime is a fortunate occurrence. Great teachers are great artists. Perhaps teaching is the greatest art because the medium is the human mind and spirit.

Successful and Unsuccessful Teachers

With a different kind of eloquence, a graduate of a cooperative vocational education program conveys a similar message, expressing the negative side of the issue. The student is Ann Ewalt, formerly a regional officer in the Distributive Education Clubs of America. The occasion was the National Conference on Cooperative Vocational Education, Minneapolis, 1969.

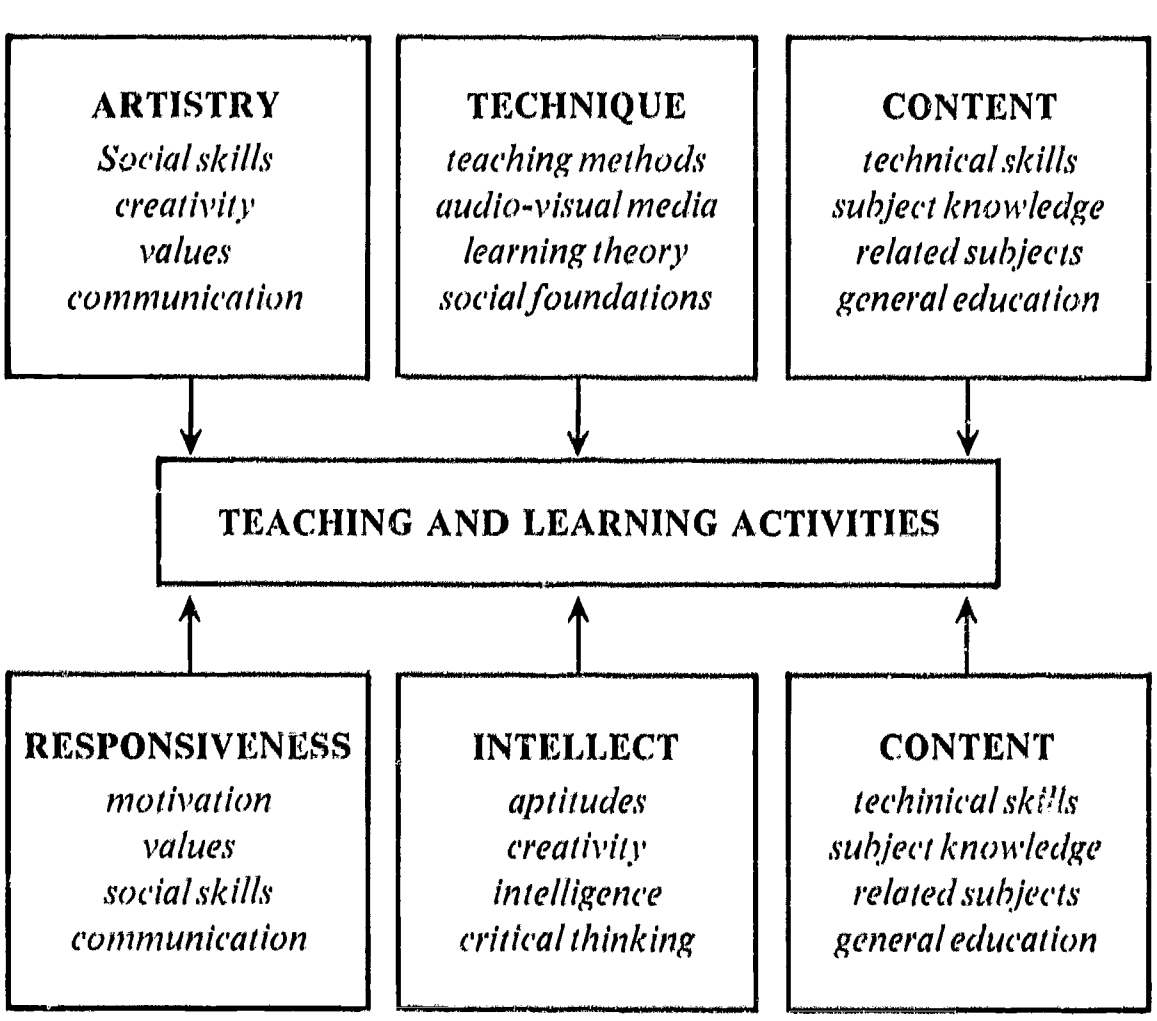
> I have many pet peeves. Perhaps number one is the teacher-coordinators. It is such a sad, sad thing for me to see a teacher-coordinator come into the classroom and ruin thirty students. I've seen it wherever I've gone. I've seen it; no matter where you turn, you see it. The first thing you have to realize is that the teacher-

coordinator is the backbone of a cooperative program. You have to be willing to give them . . . the extra special training because they have to care. They have to care so much that it hurts; that they are willing to work the extra hours, that they are willing to go the extra mile, because you can't inspire students, you can't make them enthusiastic, you can't do a darn thing with the student unless you've got a teacher . . . you've got to have top-grade teachers.

At the same conference, Dr. H. I. Willett, Superintendent of the Richmond, Virginia schools, made the point that people without professional training may be more effective than professionals.

FIGURE 2

RESOURCES OF THE TEACHER



RESOURCES OF THE LEARNER

> I would like to emphasize some of the results that we are getting from the use of para-professionals. Now, we have known for a long time that you do not have to have a teacher with a master's degree in child development to help children put on their galoshes. But, you know, the major thing we are finding is that some of these para-professionals are able to communicate with these youngsters (high school drop-outs) when the professionals cannot . . . All I am trying to say here, ladies and gentlemen, is that we must use the best that we know in terms of the relevance of technique. If we could just stop teachers from talking all the time, and set up learning situations . . .

The highly personal reflections quoted in the above paragraphs are strikingly consistent with the findings of a research effort in which Kaufman (1968, 6.a.) capitalized on an unexpected opportunity to compare a group of effective teachers with a group which was without question ineffective (in vocational and academic programs for high school drop-outs). Such investigations are rare, apparently because researchers are understandably reluctant to directly and openly identify teachers as ineffective. This one is reviewed in detail here because of its obvious implications for cooperative vocational education and because the research design appears to be effective and adaptable.

The design and procedure of this unusual piece of research are described as follows:

> A composite picture of the effective teacher and the less effective teacher was developed from taped interviews with the instructors in the program. Teachers were evaluated as either successful or unsuccessful on the basis of ratings of twenty-five categories concerning teacher attitudes, behavior, and effectiveness. The unsuccessful category included teachers who fell into an "average" bracket because it appeared that the general effect of instructors who were only "average" was detrimental to a program which required a highly specialized approach to the type of student enrolled in the experimental program. As a result of the ratings, eight teachers were categorized as successful and fourteen were classed as unsuccessful, including eight ineffective and six average teachers.

An unusual feature of this research report is the unstructured, straightforward way in which the interpretation of the taped interviews was approached. The researchers simply reviewed the tapes, sorting out information and classifying it so that similarities were identified. The report is written in a style which indicates that the researchers were confident of their own interpretations, and confident that their personal values and attitudes toward the students and teachers were appropriate. It is clear that others, holding different attitudes and values, might have produced a somewhat different set of findings from the same data. However, that Beberman, Ewalt, Willett, and Steinbeck would likely derive similar findings, since their values are apparently similar to those of Kaufman and his associates. Perhaps many readers will have similar values.

The findings of this portion of the Kaufman study are very briefly summarized below. Acknowledging that "these constellations of variables constantly interact and influence each other and thus in actuality are inseparable," the characteristics of the successful teachers were described as follows:

> There appeared to be three crucial aspects of the teacher's relationship with his students: (1) his ability to relate to them personally, (2) his ability to teach them, and (3) his attitude towards them.
>
> (1) The major correlates of ability to relate to the students include a student-centered approach to teaching, insight, personal flexibility, tendencies to critical self-evaluation, and willingness to assume the role of a "listener" and even of counselor when necessary.
>
> (2) The instructor's success as a teacher depends upon his flexibility and creativity in approaching the teaching situation, his personal dynamism, and his willingness to expend effort and energy beyond the minimum required.
>
> (3) The attitudes which the teacher brings to the classroom are fostered and reinforced by his personal characteristics and his interaction with the students. His success in approaching the youth as a teacher and as a person is contingent upon the projection of a positive, accepting, and caring attitude. Any negative emotions on his part are inevitably communicated to the students in subtle but lethal forms. The examination of attitude will focus on the regard the teacher has for his students personally, socially, and academically.

Each of the above mentioned factors is discussed in the report, with selected samples of teacher comments taken from the taped interviews, as illustrations. To give the reader a bit of the flavor of this research report, the following quotations are presented. The first is taken from an interview with a "successful" instructor in a vocational skill training program illustrating how he was able to relate to his students:

> When I started (in the middle of the term) the kids were so wound up I didn't know how to get to them. But when I took off my tie and became a worker with them things started to smooth out better . . . I mentioned they could call me by my first name, being that I was in there as a tradesman going to teach them stuff that I knew. And we could talk man to man more . . . And I'd get down on the floor and work with them . . . When I was working they'd lean on my shoulder and stuff like I was a "big brother." It didn't bother me. I encouraged it.

In contrast, the following are comments by an "unsuccessful" teacher who apparently was not able to relate to his students.

> If an appliance doesn't work it takes patience to fix it, patience which these people do not have. These people didn't want to be lectured

> to . . . their attention span was very short. You had to keep them busy or they'd get into mischief. They're very immature . . . They were horsing around, acting like juveniles, like elementary students really . . . These people have their habits. Their habits are well ingrained by the time we get them and you're not going to see a great change in their personality just by having a short (counseling) interview.

To conclude the review of this study it seems pertinent to relate some of the specific findings with respect to the "successful" teachers' methods and tactics in the teaching-learning situation.

> Flexibility and creativity are essential to success in teaching youth who have failed because of personal problems and learning difficulties . . . To retain these students, teachers must develop fresh, exciting approaches to teaching techniques, including selection and presentation of subject matter as well as flexibility and ingenuity in grading systems and testing . . . Many teachers, in attempting to maximize individual contact and attention for each student, found themselves using a great deal of discussion and informal grouping. They tended to avoid straight rows of chairs and constant lecturing, concentrating more on discussion, directed thinking, and the exchange of ideas because these students had a strong need to be heard and to have their opinions accepted.
>
> One of the teachers' first discoveries was that it was essential that they reconstruct their course formats in order to present the students with materials of high personal relevance. Many found that academic abstractions were lost on these students, yet they took great interest in topics which they could identify with themselves or with those around them, even when the topics were very difficult and involved new concepts and ideas . . . The unsuccessful teachers, showing little evidence of creativity or flexibility in teaching, tended to use the same lesson plans they had repeated with other students they had taught in the regular high school. They considered the most serious problem in the program to be the absence of a set text, standard tests, and lesson plans they could follow without thought or effort. Some taught above the heads of the students, never revising their programs to the needs of the youth. Others underestimated the students' abilities and taught them nothing.

Many other studies may be found to describe the teacher and the teacher-coordinator in vocational education, but few have such direct and obvious implications for teacher education.

A study by Lesh (1966, 6.a.) supports the finding in the Kaufman study and the assertion by Willett about the effectiveness of teachers who may not have a high degree of professional training. This document describes how nonprofessional workers can be of service in youth employment programs. It was found that they can relate well with underpriveleged youth.

Lesh recommends that these individuals be given training in social and psychological problems of youth, youth and the labor market, operation of public and private social agencies, and communication skills.

Many review and synthesis papers have been addressed to this topic. If the reader chooses to pursue it in more depth than this chapter provides, an article by Samson (1968, 1.) is recommended. As he reviews research related to "characteristics and competencies" Samson says:

> There is little doubt that the personal qualities, subject matter knowledge, and teaching skills of vocational teachers are important to performance. The problem is to identify the kinds and amounts of each of these competencies which distinguish between acceptable and unacceptable performance in order to provide specific goals for use in curriculum development and for teacher evaluation.

Following are 16 assorted reviews of the research reports which were found in this search of the ERIC collection and *Dissertation Abstracts.* In general they may be identified as descriptive research. Most use a procedure or instrument designed to assess or measure, or simply to identify, some specific characteristic of the group of teacher-coordinators or vocational teachers under investigation.

Teacher-Coordinator Personality

A doctoral study by Harry Olson (1967, 6.a.) is designed to determine the relationships between certain personality characteristics and the job satisfactions of distributive education coordinators. "Personality" was measured by using *Cattell's Sixteen Personality Factor Questionnaire.* It was found that:

> The teacher-coordinators studied were warm-hearted, easy-going, participating; bright, thinking in abstract rather than in concrete terms; stable, calm, realistic; gay, enthusiastic, happy-go-lucky; venturesome, socially bold, uninhibited, spontaneous; good at making contacts, not shy; likely to be elected to leadership positions in face-to-face groups; trusting, free of jealousy, easy to get along with; practical, forthright, natural; possessed by a level of anxiety which is manifested for normal situational reasons; somewhat group-dependent; and generally lacking in closeness to the personality of clinically-diagnosed neurotics.

Many readers may find that their perceptions correspond with Olson's description of the "ideal" distributive education coordinator. It is difficult to imagine how such a person could possibly fail as a teacher. However, if these are minimum requirements, the challenge to a teacher education program appears to be almost too great to contemplate.

With respect to the satisfaction variables in the Olson study, it was found that:

> Teacher-coordinators tested were most satisfied with (a) feelings of accomplishment, (b) ability to keep busy all the time, (c) oppor-

tunities to be creative, (d) chances to work alone on the job, (e) lack of conflict with moral values, (f) freedom to use their own judgment, (g) job security, (h) opportunities to do things for other people, and (i) variety on the job.

The Olson study is obviously a very intricately designed piece of research. While the above findings may seem to be the sort of "folklore" which would be found on opinion-based questionnaires, in fact the findings grew out of what appears to be a very scientific approach to the study of personality.

Another doctoral study (Conley, 1965, 6.a.) was designed to identify factors related to teacher effectiveness of high school distributive education teacher-coordinators. This was a very ambitious study which included a wide array of personality measures, biographical factors, ratings of performance, etc. Some of the findings included "grade point for English composition showed a relationship to emotional stability" and "political variable on *Allport-Vernon-Lindzey Study of Values* showed a relationship to personal traits, professional qualities, and composite rating by supervisors." No attempt is made to present a comprehensive review of this study, but it seems that it would be very difficult to develop a teacher education program utilizing the kind of information produced by this type of study.

Musgrove (1968, 6.a.) conducted a unusual study attempting to relate vocational teacher effectiveness to occupational experience and other background data. It was:

> A type of ex post facto research wherein the dependent variable of teacher effectiveness was measured and then the independent variables of occupational experience, teaching experience, college training and electronic technical training were examined in retrospect for their possible relations to teacher effectiveness.

The input data were derived from teacher rating scales completed by supervisors, self-evaluations completed by the vocational electronic teachers themselves, and teacher effectiveness scales completed by students. An interesting conclusion was "in view of these inconsistent findings, it would seem that there is insufficient evidence from this study to conclude that the amount of electronics work experience should or should not be a primary consideration in the certification and hiring of vocational electronics teachers." Similar statements are made with respect to the relationship of teacher effectiveness to the amount of previous teaching experience and the amount of college training.

Objectives for Teacher Preparation

Many studies have been designed to determine the job performance requirements and activities of coordinators in cooperative vocational education.

The Crawford study (1969, 6.a.) was described in Chapter III as an example of this kind of research. The purpose of the entire study was to develop an inventory of specific objectives related to distributive teacher

education. The procedure involved the determination of the critical tasks and competencies required of students who would ultimately be employed in distributive occupations. This information was assumed to be essential in the development of the technical competency objectives which should be mastered by prospective teacher-coordinators. An additional set of "professional objectives" relates to the tasks of curriculum development, methods of teaching, understanding of teaching-learning processes, human growth and development, guidance, public relations, coordination, and program administration. This list of specific objectives represents what appears to be a very complete description of the required capabilities and activities. The approach used in the Crawford study represents an interesting contrast to the approach used in the studies reviewed above, especially the Olson study, which produces a very different kind of information. It is our impression that both kinds of information ought to be carefully utilized in the development of the objectives and the design of instructional programs for the training of vocational education teacher-coordinators.

Schenk (1969, 6.a.) conducted a study of difficulties of beginning business teachers. He found that the teachers felt that related work experience should be prerequisite for teaching and that college credit should be given for it. The teachers complained that their methods courses had not provided enough specific information about specific subjects. No relationship between the effectiveness of the teacher and the kinds of difficulties encountered was found.

Expert judgment was used by Cook (1966, 6.a.) to determine the "minimum requirements" for office occupations teachers. The procedure consisted of asking "leaders in the fields of office occupations education and business education" to develop guidelines for the preparation of office occupations teachers. This was done in a series of clinics during which city and state education supervisors, teacher-educators, and consultants met to determine the requirements, revise, rephrase, edit, and validate the product.

Critical Behaviors of Teacher-Coordinators

Another approach which has an element of expert judgment in it is the "critical incidents technique." An excellent example of this kind of research is found in the Samson study (1964, 6.a.). The purpose was to determine effective and ineffective behaviors of high school distributive education teacher-coordinators. Students, supervising school administrators, faculty members, and employment training sponsors were asked to report "critical incidents" which they observed to be related to effective performance of distributive education coordinators whom they had known. The information was classified and categorized to produce a list of 77 effective and 50 ineffective "critical behaviors." One interesting finding was that women coordinators were more effective than men. Teacher-coordinators who were younger, in the lower salary group, with less educational

preparation. and fewer years of teaching experience in the distributive education field received higher overall percentages of effective critical behaviors than counterpart groups in older or higher divisions. Teacher-coordinators who had more occupational experience in distributive work received a larger percentage of effective behaviors than those with less occupational experience.

Another study of the critical requirements for teacher-coordinators was conducted by Harris (1965, 6.a.). This study was complicated by an effort to make "reasoned-judgment" comparisons of the critical requirements with various other factors such as program and community characteristics. The findings which have implications here were not substantially different from those of the Samson study.

Teacher-Coordinator Roles

While the above studies are mainly concerned with identification of behavior which is assumed to be appropriate and/or inappropriate, other studies are simply concerned with describing the behavior of the typical coordinator. Often these studies are framed to determine the "role" by first developing a lengthy list of activities in which the coordinator might engage, presenting this list to practicing coordinators, counselors, school superintendents, students, training sponsors, and others. The findings of studies of this type are assumed to represent a sort of job description. An example is a study of the role of the local distributive education coordinators in New Mexico (Lloyd, 1965, 6.a.). The following findings are typical:

> It would seem that superintendents want coordinators to exercise initiative in promoting and administering their programs. Superintendents also considered the public relations aspect of the program as very important. Principals wanted coordinators to stress quality of the program and to help DE students to get good training jobs rather than getting part-time jobs for other students. Head counselors ratings of duties reflect high concern for giving information about the program to students, parents, and other members of the school faculty. Businessmen wanted coordinators to screen applicants for DE programs so as to assure some quality of students admitted and to check students' on-the-job performance frequently.

A similar study (Helling, 1965, 6.a.) used the same procedure but compared the roles of counselors and coordinators with respect to counseling functions. As one might expect, the roles of counselors and coordinators overlapped in many activities. It was found that the coordinators rather than the counselors do most of the counseling of cooperative vocational students, and the findings of the study stressed the importance of good communication between counselors and coordinators.

A recent study by Goodman (1969, 6.a.) was concerned with an analysis of the role of the teacher-coordinator in a work-experience education

program for potential drop-outs. As in the studies by Helling and Lloyd the coordinator's role was defined by the expectation of certain key people, in this case coordinators, other teachers, school administrators, and work supervisors. The data were gathered by using a questionnaire listing 53 possible tasks, and asking the respondent to indicate whether the coordinator "must," "should," "should not," or "must not," perform the task. Some of the tasks were interviewing students, teaching the related class, assisting with job placement, visiting work stations, visiting homes of students, securing progress reports, etc. Most of the respondents indicated that the coordinator should perform the listed tasks.

Teacher Attitudes and Opinions

Another type of study which logically fits into this presentation is concerned with opinions or attitudes of cooperative vocational education coordinators. The topics of these studies are many and varied. Four that were found in this search are briefly described.

Brown (1965, 6.a.) investigated the attitudes and opinions of vocational agriculture teachers and their administrators regarding certain aspects of the vocational agriculture program. The purpose of the study was to determine whether these two groups agreed with each other about the importance of such program features as the need for adult and young farmer education, the value of the student club program, and whether curriculum changes were needed. Both groups were in "harmonious agreement" on most issues.

Brantner (1964, 6.a.) studied trade and technical teachers' opinions on in-service education. The main purpose of this questionnaire-survey was to identify in-service training activities in which the teachers would be willing to participate.

A study by Miller (1966, 6.a.) was designed to describe and compare teachers' views and their perceptions of their principal's views toward vocational agriculture programs, supervised practice programs, and vocational education generally. The main concern was the relationship between the teachers' attitudes and the teachers' adoption of a new concept of supervised practice. Some of the findings showed that the teachers' attitudes were more positive than what they perceived their principal's views to be.

Norma Bobbitt (1969, 6.a.) conducted a somewhat more complex study with several objectives. The purpose of the study can be defined by simply quoting the title which was: "A Comparative Study of Undergraduates, Homemaking Teachers and Occupational Teachers to Ascertain Attitudes, Knowledges and Plans in Relation to an Employment Emphasis in High School Home Economics." The subjects of the study were 25 home economics students, 25 homemaking teachers, and 25 cooperative occupational teachers. A 40-item questionnaire was administered to provide information about attitudes toward the employment aspect of home economics, preferences for teaching in employment related home economics programs, and knowledge which would have been taught in a senior course

of study. It was found that students were most favorable. occupational teachers next, and homemaking teachers least favorable toward the idea of teaching home economics with an occupational emphasis. An attitude scale was used, with F-ratios produced for each item on the questionnaire. The knowledge test appeared to be the final examination for a course in wage earning home economics. Few significant differences were found between the attitudes of the occupational teachers and the students, as might be expected. However, the homemaking teachers differed both in attitudes and in their knowledge of the program, with the other two groups.

Instructional Methods for Teacher Training

The studies reviewed to this point have been mainly concerned with determining the roles, functions, attitudes, perceptions, activities, and various other characteristics of the teacher-coordinator. In most cases, the purpose of the study was to learn something which might have implications for the development of a teacher education program. Following is a review of research related to the broad strategies and specific tactics for training teacher-coordinators. Only two studies were found which were directly concerned with instructional methods or techniques. One has been described earlier (Pratzner, 1969, 6.b.) in which it was found that motion pictures with sound were more effective than traditional instruction in the presentation of fundamental concepts of teaching to craftsmen who were to become part-time industrial education instructors. The second study was concerned with micro-teaching and classroom teaching skills (Brown, 1968, 6.b.). This study was designed to produce information about two related questions. First was the question of whether micro-teaching was more effective than a traditional method in teaching business and distributive education interns a set of six basic instructional skills. The second purpose was to determine if the type of audience in the micro-teaching situation was related to the effectiveness of the instruction.

It was found that micro-teaching produced "significant levels of change" ($p < .05$) in five of the six teaching skills while the control method produced change in only one skill. This evidence suggests that micro-teaching (with television recording and playback as part of the process) is significantly more effective than traditional instruction as a method for training teachers.

The second question was approached by comparing three micro-teaching groups: one with high school students as the audience, another with beginning education students, and a third with the methods class peers. It was found that the type of audience made no difference. If this evidence is accepted, the more economical method of using the class members (role playing) as students is justified.

Pilot Demonstration Projects

To conclude the review of research concerned with teaching and leadership resources, five examples of experimental pilot or demonstration projects are discussed. The purpose is to illustrate the nature and variety to be found in this type of research.

An interesting project directed by Meyer (1967, 6.c.) brought distributive education coordinators together for seven weeks of directed occupational experience. The participants were employed for two eight-day periods in two different firms. Seminars and workshop activities were also included. The learning activities touched upon many curriculum and course development tasks such as job analysis and development of instructional materials. As is typical of this type of research, the findings are presented in terms of the various benefits derived and apparent growth of the participants.

While the purposes of the project described above are to strengthen the participants in their present roles, the purpose of a project directed by Wenrich (1966, 6.c.) was to assist the participants in preparation for future employment in leadership positions in vocational-technical education. Candidates were selected on the basis of their performance on standardized tests. Selection criteria also included age, work experience, teaching experience, and education. The group was randomly divided with one-half attending an eight-week summer workshop followed by a year of "internship" which included periodic seminars. The other half participated only in the "internship" experience. Comparison of the two groups revealed that the selection procedure was ineffectual, with the conclusion that better tests were needed and that more appropriate selection criteria should be identified.

Both the Meyer and Wenrich projects have been followed by improved, expanded and updated efforts, but the reports were not available for this review. On the basis of the available evidence it appears that these two projects represent a very desirable pattern where a need is identified, a project initiated to demonstrate the feasibility of a strategy for satisfying the need, and ultimately a series of projects follows to make a significant impact. The result is not simply more knowledge of what should or can be done, but also an important contribution is made in satisfying the need.

A project described by Bohn (1967, 6.c.) was similar to the Meyer project in that occupational experience was a component of a system to upgrade the technical competency of teachers of industrial subjects. The main strategy of the project was to provide the teachers, during a summer term, with short employment experiences and field study in their specialty areas. A laboratory was set up on-campus with up-to-date industrial materials and equipment in the areas of automotive power, industrial drafting, electricity and electronics, and metals technology. Success of the project was measured in terms of new course offerings and new units of instruction initiated by the participants, equipment requests and the number of schools using the instructional materials. According to these measures, the project had a very substantial impact on what happened to students in the teaching-learning situation.

Hull and associates (1967, 6.c.) used a similar approach to evaluate the effectiveness of a series of workshops to introduce vocational agriculture teachers to instructional materials content and procedures which were already in use in distributive education. Since many off-farm occupations are in fact distributive or industrial occupations (or a combination of both),

teacher educators at Oklahoma State University acted on the assumption that it would be better to utilize appropriate existing materials and techniques, than to "start from scratch" in program development.

Pre- and post-test data showed that participants' cognitive learning in the area of distribution increased significantly. However, follow-up evaluation revealed that implementation was apparently difficult. Many of the participants had integrated the distribution units into their regular instruction but the anticipated emergence of cooperative vocational programs did not come about to a significant degree. It appeared that problems of administrative support, convenient availability of training stations, and other related problems hampered the implementation process.

Institutes and Workshops

Another important source of information about teaching and leadership resources development is the report of conference, institute, seminar, or workshop proceedings. Typically a document is prepared to describe the program and summarize the content, usually in the form of transcripts of speeches or workshop reports. These documents are not viewed as research project reports in the usual sense. Some examples are mentioned in the following paragraphs. Many more may be found through a casual search of the ERIC collection index catalogues.

Vivian and Hoffman (1967, 6.c.) brought vocational teacher educators and national leaders in vocational education together for a seminar to identify alternative approaches for improving programs to prepare and upgrade teachers. The document includes speeches on a variety of topics.

A booklet based on a series of institutes on work education for retarded youth (Lord, 1964, 6.c.) summarizes speeches and panel presentations on how to establish work education programs.

The final report of a workshop on organization and operation of cooperative work experience programs in trade and industrial education (Harris, 1967, 6.c.) includes summaries of various presentations.

Another project report (Haines, 1968, 6.c.) includes a series of papers presented at a seminar designed to assist teacher educators and supervisors in distributive education in responding to the Vocational Act of 1963. Although the "project plan" was the focus of the seminar, the papers presented range across an assortment of problems and issues.

Beckman and Quirk (1967, 6.c.) conducted a conference with the objective of presenting the findings of research on apprenticeship training as the basis for a discussion of problems and concerns in this area. Again, the document appears as a collection of the transcripts of papers presented at the conference.

A workshop on agri-business program development was conducted by the Oklahoma State University Research Foundation (1965, 6.c.). The document includes units of content material produced by the participants, and a set of program operation guidelines.

The last example is a series of conference seminars on cooperative vocational education sponsored by the U.S. Office of Education. First in the

series was conducted at the University of Minnesota (1969, 6.c.). The notes and working papers plus a set of guidelines for cooperative vocational education seem to be the most valuable of the conference reports reviewed here in presenting current thinking of key people concerned with cooperative vocational education.

This concludes the consideration of research and literature related to the development of teachers and leaders for cooperative vocational education.

Program Administration

Many of the tasks identified at the end of Chapter I as essential in cooperative vocational education may be viewed as administrative activities. Taking a more comprehensive view, many of the administrative activities in the broad fields of occupational education directly affect cooperative vocational education. Therefore, a review of pertinent research in the area of program administration would be a very large undertaking. This presentation includes only a few examples, the documents (listed in the bibliography) are classified as follows:

1. Reports of research on various aspects of program administration.
2. Literature or administrative guidelines for various aspects of program administration.
3. Manuals which present guidelines for program development and operation.

Here are identified some examples of the various types of research and literature that might be found, so that the reader may have a better perspective of what a comprehensive search and review would produce. A review and synthesis project sponsored by The Center for Vocational and Technical Education is entirely devoted to this topic (Wenrich, 1969, 7.a.). An article by Lee and Hamlin (1968, 1.) is another good source of reference material on organization and administration of vocational education programs.

Research oriented to some specific aspect of cooperative program administration is not as common as one would expect. No well-articulated theory of administration is found at this time, as the framework for such research, and what appeared in the ERIC search was disappointing. The few studies applying cost-benefit analysis to administrative decision-making in vocational education (Warmbrod, 1968, 7.a.) suggest that perhaps the next decade will bring substantial research and innovation in this area.

Following are a few examples of research which are concerned with a specific aspect of vocational program administration.

Two doctoral studies were designed to determine the functions of advisory committees. Klein (1964, 7.a.) developed a "Curriculum Advisory Council Performance Scale" which he proposed as an instrument for evaluating the effectiveness of advisory committees. The advisory committee would be assumed to be effective if it performed the functions or roles corresponding to those on which the instrument was based.

Using a sophisticated procedure for interpreting the responses of members of junior college vocational program advisory committees, Carlson (1967, 7.a.) produced a list of suggested functions and activities. Some examples are: "Carefully planned agenda should be distributed to committee members well in advance of scheduled meetings" and "Committees should conduct follow-up studies of students who have completed vocational programs."

Using a widely distributed mail questionnaire, Jantze (1966, 7.a.) studied college level office work experience programs. Six institutions which seemed to have good programs were studied in depth through personal visitations by the researcher. A set of "basic principles" of work experience in office occupations was developed and validated by ratings of "prominent business educators and curriculum specialists."

A doctoral study by Yeo (1965, 7.a.) was addressed to the interesting question: "Does, as the theorists assume, a curriculum developed without detailed local research differ from one developed with such research?" The procedure was to identify a community college program which was presumably developed without the benefit of detailed local research. A summary of detailed information about the community including questionnaire studies to determine opinions, attitudes, feelings, and needs of students, along with pertinent facts about staffing, budgeting, facilities, etc., was presented to a "panel of experts" who were asked to make curricular recommendations. Comparisons of the expert and actual curricular decisions revealed that "while this particular college adopted the meeting the needs goal, based on judgments of unbiased, knowledgeable judges, that college's curricular plans did not fulfill that goal."

A study by Purtzer (1967, 7.a.) used a mail questionnaire to determine policies affecting acceptance of transfer credit for courses in technical education. Forty-eight colleges responded. It was found that all colleges except one granted credit for courses in accredited junior colleges but half refused credit from non-accredited technical schools and 40 percent would not grant credit for work experience.

Wenrich (1963, 7.a.) conducted a survey of local vocational administrators regarding the financing of vocational education in Michigan. One interesting finding was that if salary reimbursements were eliminated, most of the programs would continue in operation without major modification. Therefore, it was recommended that support be withdrawn for salaries after five years of program operation.

These few studies are examples of the kinds of research which might be conducted with respect to the many and varied problems of program development and administration in cooperative vocational education.

Another good source of information about various aspects of program administration is literature which is not based on research. Some examples are: A guide to the selection of clinical facilities for associate degree nursing programs (New York State Education Department, 1966, 7.b.); a booklet on the role of the advisory committee in occupational education in the junior college (Riendeau, 1967, 7.b.); an article on the utilization of a new type of

building and a new concept in apprentice training in a junior college (Arnold, 1966, 7.b.); a report of an in-service teacher education institute for off-farm agricultural occupations teachers, which identified a number of problems of administration in this type of cooperative vocational education program (Dupy, 1966, 7.b.).

To conclude the review of materials concerned with program administration, it seems appropriate to present some examples of the guidelines for program development and administration which were found in the search of the ERIC collection. Table 5 shows that some of the studies are oriented toward a specific student clientele, while others are oriented toward a specific occupational field, and still others are broadly oriented across all the areas of vocational and technical education.

TABLE 5

PROGRAM ADMINISTRATION GUIDELINES

Reference	Topic
Cowles, 1967, 7.c.	Work-study program for exceptional children
Crawford, W., 1967, 7.c.	Work-study program for slow learners
Jones, 1964, 7.c.	Occupational therapy programs for the physically handicapped
Kolstoe, 1965, 7.c.	Work-study program for mentally subnormal students
Miller, 1965, 7.c.	Work-study program for educable mentally handicapped
Santa Cruz, 1966, 7.c.	Work-study program for severely mentally retarded pupils
Crockett, 1968, 7.d.	Law enforcement education in community colleges
Hedinger, 1967, 7.d.	Apprentice education in community colleges
Mississippi, 1964, 7.d.	Trade and industrial education cooperative part-time programs
Anderson, 1967, 7.d.	Vocational agriculture cooperative work experience programs
Wolf, 1966, 7.d.	Agri-Business and services program
Levandowski, 1969, 7.d.	Cooperative distributive and office education
Lowman, 1963, 7.d.	Diversified cooperative training
Davis, 1966, 7.d.	Occupational experience programs
Huffman, 1967, 7.d.	Cooperative education
Festante, 1965, 7.d.	Part-time cooperative education programs
University of Minnesota, 1969, 7.d.	Cooperative vocational education

Program Evaluation

Evaluative studies in cooperative vocational education are found in profusion in the ERIC Collection and in *Dissertation Abstracts*. Most commonly found are follow-up studies of the student graduates of specific local programs. Another type is the descriptive report, in which factual information is accumulated and used as the basis for assessing the effectiveness of the program. Rather than attempt a review and synthesis of these studies, they are presented in Table 6, classified according to program type. A few descriptive studies are large scale, comprehensive descriptions of statewide, regional, or national programs.

A comprehensive evaluation of vocational education in secondary schools was conducted by Kaufman (1967, 2.a., 8.b.). This monumental study provides an abundance of descriptive material and information which can be most useful in gearing the cooperative vocational programs to meet the demands and challenges of our modern society.

An entirely different type of research which is equally pertinent and useful appears as the notes and working papers concerning the administration of programs authorized under the Vocational Education Act of 1963 prepared for the subcommittee on education of the Labor and Public Welfare Committee of the United States Senate (1968, 1., 8.b.). The materials in this series of three documents (which are bound in one cover) were produced in order that the members of the subcommittee and interested senators could have immediate access to the recommendations of the members of the advisory council on vocational education. A large amount of pertinent descriptive material is found and the testimonies of many eminent people are presented to reflect their perceptions of needs, problems, issues, and concerns.

TABLE 6

RESEARCH CONCERNING PROGRAM EVALUATION

	Program Descriptions
Mock, 1965, 8.b.	Cooperative distributive education programs in Arkansas
Travis, 1967, 8.b.	Cooperative programs in a college of business
Miller, 1968, 8.b.	A work experience program for potential high school drop-outs
Meisner, 1967, 8.b.	Neighborhood Youth Corps projects
Wasden, 1968, 8.b.	A study of trade and industrial education in Utah
Eisen, 1966, 8.b.	Work experience education in California high schools
Rajan, 1965, 8.b.	Registered apprenticeship program in Wisconsin

TABLE 6—Continued

McCleary, 1967, 8.b.	Metropolitan high school vocational education programs
Moore, 1966, 8.b.	Distributive education programs in post-secondary schools
Holloway, 1967, 8.b.	High school cooperative vocational education program
	Follow-Up Studies
Herman, 1967, 8.c.	Neighborhood Youth Corps in New York City
Matteson, 1966, 8.c.	Vocational education students in Wisconsin
Stavros, 1966, 8.c.	Youth employment project trainees
Levenson, 1964, 8.c.	Automotive mechanics program graduates
Eggenberger, 1964, 8.c.	High school vocational agriculture graduates, Texas Panhandle area
Priebe, 1967, 8.c.	Vocational agriculture graduates, North Dakota
Dunlap, 1967, 8.c.	Terminees from out-of-school projects, New York City
Buenaventura, 1967, 8.c.	MDTA program for Mexican migrant farm workers
Haines, 1966, 8.c.	Cooperative vocational education graduates in Michigan
Zancanella, 1965, 8.c.	High school cooperative part-time distributive education students
Larson, 1967, 8.c.	Two-year college cooperative retailing program
Robertson, 1965, 8.c.	Cooperative education program graduates
Lelievre, 1968, 8.c.	Cooperative program for accounting majors, University of Cincinnati
Findley, 1967, 8.c.	Educable mentally retarded vocational education graduates
Hecht, 1963, 8.c.	High school retailing program graduates
Tuttle, 1965, 8.c.	Cooperative training program graduates
Landrum, 1968, 8.c.	Neighborhood Youth Corps program enrollees
Nennich, 1969, 8.c.	Office clerical students in cooperative office education

An example of a statewide effort (Borosage, 1963, 8.b.) was a study of vocational education in Michigan. The recommendations which grew out of this evaluation project have had an obvious impact on vocational program development in that state.

Another type of study is designed to produce a set of evaluative criteria, an instrument, or perhaps a total system for program evaluation. An example of the latter type is a project for developing and validating a system for evaluating local programs of vocational-technical education (Byram, 1968, 8.a.). This was a project in which "clinical schools" were set up around the country as a basis for developing and testing the various evaluative criteria, procedures, and instruments.

The Pennsylvania State Department of Public Instruction (1965, 8.a.) developed an instrument for evaluating a department of vocational agriculture. Another example of this type of research was the development of a self-evaluation instrument for the business and office education programs in secondary schools (Addison, 1967, 8.a.). Hoffman (1968, 8.a.) developed an instrument to assess the composite subject matter achievement of high school cooperative distributive education students.

There is much that might be said about the evaluation of occupational education programs. The theoretical model for the development of educational programs (Figure 1) implies that evaluation should be a major factor in promoting innovation, improvement, and constant reappraisal of the educational enterprise. Moss (1967, 1.) produced a tentative model for conceptualizing the roles of evaluation as an agent in the process of change in education. For the reader who might wish to explore more fully a theoretical framework in which evaluation might operate, this interesting document is recommended.

Moss makes the observation that:

> One of the most critical aspects of program evaluation, and the one which has thus far probably received the least attention, is the identification and measurement of the program outcomes which are to serve as evaluative criteria. Everyone affected by evaluation, and that is all educators, must be concerned with developing as complete an array of relevant potential outcomes as possible for use by evaluators.

Another important point which Moss makes, and which this review procedure has confirmed, is that evaluative criteria should be in terms of program outcomes rather than in terms of program characteristics. Finally, new approaches and procedures in program evaluation are needed. Moss suggests the following: formative evaluation, expert and self-evaluations, follow-ups, experiments, interrupted time series, regressional analysis, and others. It appears that the technology required for more effectively evaluating occupational education programs is available. What is needed is an effort to adopt and utilize the best available techniques and procedures when programs are evaluated.

VI

PRIORITIES, PROBLEMS, AND ISSUES

State of the Art

The process of development of a scientific discipline may be viewed as consisting of several stages. First, basic concepts are formulated, communicated, and accepted informally as guidelines for practice, but no well-articulated theory has emerged. The second stage is one in which selected postulates are tested as a means of validating or verifying some of the basic concepts and the beginnings of theory building occur. During the third stage the basic concepts appear, cloaked with academic respectability, in the form of a logically structured theoretical (or philosophical) system. Research and development reaches a peak in the fourth stage as theorists coordinate their efforts to transform the soft theoretical structure, part by part, into a solid set of scientific principles or laws.

The reader may visualize this concept of scientific discipline building by considering an example from the medical profession. A century ago, Joseph Lister brought to surgery the principle of antisepsis, an outgrowth of Pasteur's theory that bacteria cause infection. Using carbolic acid as the antiseptic agent, he devised techniques of applying it which, when used in conjunction with heat sterilization of instruments, brought about dramatic decreases in postoperative fatality. Pasteur formulated basic concepts and initiated the theory building process. Lister, after extensive research and development activities, transformed the theory into a set of principles which now govern medical practice.

As assessment of the current status of cooperative vocational education research is summarized by one of the technical reviewers. His comments are characteristic of the second stage. After reading this paper, he concluded that:

> The real and telling aspects of cooperative education are yet crying to be carefully researched. The major portion of that done to this point is peripheral—and that which needs to be done so badly is dodged because it takes resources, research sophistication in many cases, and commitment which we do not seem to have.

He said that he ". . . would like to see, as a concluding statement, a summary of the 'state of the art' along with a pulling together of the nature and priorities for future research effort needed in this field." One roadsign on the way to the development of a set of principles is the emergence of "state of the art" reports to a community of scholars who are interested in, and perhaps involved in theory building research.

An obvious finding in this search and review effort is that the Joseph Lister for cooperative vocational education has not yet appeared. How-

ever, the counterpart of Louis Pasteur may now be at work (as an individual or as a group). It would be easy to name a dozen prominent individuals who might be able at this moment, to formulate a theoretical framework for cooperative vocational education, if they were given the opportunity and the challenge. Perhaps a product of the 1969-70 U.S. Office of Education sponsored series of institutes on cooperative vocational education will set the pattern for theory building research. In any case, it appears that the basic concepts of cooperative vocational education need to be logically organized, articulated, and subjected to systematic theory building with the establishment of guiding principles as the pervasive goal. This appears to be the item which should receive first priority in the research and development of cooperative vocational education.

Gaps in the Research Effort

For the reader who has had the endurance to read the preceding chapters, the priorities, problems, and issues identified here will be recognized as only the beginning of a list that should be more fully developed and refined.

The theoretical model for program development and the 15 cooperative vocational program development tasks identified in Chapter I are used as a framework for the following review of research needs and priorities.

1. There is a need for full and comprehensive development of a theoretical and philosophical framework for research and development in vocational and technical education. The fragmentary, isolated theory building efforts which are now in process should be more effectively communicated and coordinated. Moss (1967, 1.) makes this point with respect to teacher education but the same might be said of other components of cooperative vocational education. At the conclusion of a brief research review in which a model for classifying teacher education research was suggested, Moss concluded:

> With some exceptions of course, little has been done which materially contributes to the development of a science of teacher education. We need a system of verified principles which will permit us to understand and control the teacher education process. At present we are still operating programs primarily on the basis of tradition, "convention" wisdom, and personal experience. This does not imply that current teacher education practices are necessarily bad, only that we really don't know their worth . . .

2. Interpretation dissemination systems should be designed so that program developers will have easy access to manpower analysis data. For additional discussion of this problem, see Kaufman (1968, 1.).

3. With the growing determination to harmonize curricula with the demands to be made upon the student-learner as he begins and progresses on a career ladder, there is a growing need for the "software" to apply modern concepts of data management to large scale occupational analysis studies (such as the Crawford study, 1967, 3.b.). Also, inexpensive, effective

methods are needed for smaller scale "do-it-yourself" task analysis research (such as the Clark study, 1966, 3.b.). Additional discussion is found under "Task Analysis Design Problems" in Chapter III.

4. Research technology is needed to provide for transformation of occupational analysis data into appropriate, valid instructional objectives. With present research procedures and techniques, the resulting statements of objectives may be unsatisfactory because intellectual behavior and characteristics are neglected while observable behavior is overemphasized. Krathwohl (1964, 1.) elaborates on this problem as he discusses "the erosion of affective objectives." A host of other problems and issues might be identified but this will serve to indicate that there is a research and development gap in this area.

5. Techniques and instruments for the evaluation of instruction are needed and it appears that this need is being recognized. This problem is evident both for cooperative vocational programs and for teacher education, where it seems that learning activities are seldom directly related to the anticipated outcomes. For example, no cases were found in which assessment of the effectiveness of a teacher education program was in terms of the changed employment behavior of the cooperative vocational students who ultimately come under the influence of the teachers in training. It appears that the chain of events between the teacher education activities and the students' job performance behavior is simply too long and tenuous.

6. There is a need to adapt standardized techniques and measurement instruments (such as the GATB) by validating them on samples from the populations with which they are used in vocational and technical education. Also, new and appropriate instruments should be developed as tools for solving the particular measurement and assessment problems in cooperative vocational education. This need is highlighted in Chapter II.

7. It appears that certain important research topics are avoided, either because they are too threatening or because they appear to be too difficult to study. Some examples are questions relating to the impact of occupational experience of the teacher-coordinator on the behavior of the student-learner; the comparative effectiveness of professionally trained vs. untrained teacher-coordinators; the educational significance to the teacher-coordinator (and his students) of the various aspects of vocational teacher education; utilization of advisory committees; development of public relations programs; student recruitment and selection; guidance and placement of students; articulation among educational institutions and levels; provision for remedial instruction and for special programs for gifted students; the impact of individualized instruction on the job performance capabilities of the cooperative student; cost-effectiveness and cost-benefit analysis of cooperative vocational programs.

8. Perhaps because objective appraisal of the effectiveness of the teacher is so threatening (to the teacher *and* the evaluator) most research efforts employ indirect measures such as supervisors' ratings (when the supervisor may not have seen the teacher in action). Valid and reliable predictors and criterion measures are needed.

9. Research on teacher education is mainly oriented to the technological aspects, the tools of teaching and learning, with only a few limited efforts at research on the artistic aspects and the human interaction aspects of the enterprise.

10. Research and development in cooperative vocational education has been almost entirely concerned with "the characteristic skill, duties, and practical understandings associated with the occupation." Very little research effort has been directed to what Borow (University of Minnesota, 6.c.) calls "the work ethos, a set of attitudes, rules of etiquette, and interpersonal skills involving relations with fellow workers, supervisors, and clients." What is needed is a redirection of cooperative vocational education so that each student may have an opportunity to cultivate the "work ethos," and to ". . . learn to see himself psychologically mirrored in the work situation, . . . to build his self-identity as worker-to-be and to know better what manner of person he is—what strengths, limitations, aspirations, and personal values characterize him." If this concept of the emerging role of cooperative vocational education is accepted, a large area of research and development is being neglected.

11. If the above statement reflects a common concern, if instructional objectives related to higher level intellectual skills, social skills, and attitudes are assumed to be important, and if the concept of teaching and learning shown in Figure 2 is accepted, a great gap in educational measurement should receive attention. Research involving such psychological constructs as "personality," "work values," "personal adjustment," and many others should receive a greater share of the available resources than the vocational education community has been willing to provide. Most of this kind of research is now limited to doctoral studies which utilize "borrowed" instruments that were developed and validated in other disciplines. Also, research is too often undertaken with inadequate instruments and procedures because they are the "best available," with frequently disappointing results.

12. Research which focuses on teaching and learning is largely oriented to technical factors. Many examples are found in the latter portion of Chapter IV. Research on the human interaction aspects of the teaching-learning situation is neglected and should be pursued with more vigor. However, the lack of a research methodology for such a task, combined with reluctance to enter the cloister of the classroom (or the training station, youth club program, counseling interview, etc.), may prevent substantial movement in this direction. First in priority, and perhaps least threatening, might be an effort to find research designs which can control the intervening variables that apparently dilute the research efforts of those who are now investigating educational technology in cooperative vocational education. (This problem is discussed and illustrated in Chapter IV.) Eventually, research efforts must be directed to the impact of certain highly personal qualities of the teacher and the behavior of the teacher as the manager of the educational enterprise.

13. As indicated in Chapter II, there are many aspects of cooperative vocational program administration which deserve research attention. Particularly important in current philosophy is the notion that no program should operate without continuing feedback concerning the effectiveness and appropriateness of the product. Increasingly administrators are being expected to develop and justify program objectives, and to produce a continuing flow of evidence concerning the quantity and quality of achievement. Therefore, new and more stringent patterns of follow-up investigation are emerging. Evaluative criteria are receiving critical attention, with more concern about their validity. Much more could be said to suggest directions and priorities for research in the area of program administration. It is sufficient here to say that research in this area is now in the process of redirection and constructive development.

14. It seems appropriate to conclude by identifying what might be the greatest gap, and suggesting a way for the reader to build his own bridge. There is a great and increasing need for the practitioners in the vocational-technical education community to communicate their research and development products. Even more critical is the need for communication with those having similar interests outside this community, in related disciplines, and in the employment community. A most effective, and apparently uncongested bridge which was of great value in the development of this document, is the ERIC collection. A few file cabinets filled with postcard sized film, a stack of reference catalogues, and a microfiche reader can provide access to a fantastic quantity of research reports and literature. A sign of genuine progress in bridging the communication gap in cooperative vocational education will be when the demand for access to ERIC microfiche collections appears as a problem on some state of the art report.

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