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ABSTRACT

Written to assist local administrators in utilizing available data to plan local vocational education programs, this publication is organized around a series of planning tasks and manpower data. As one of the important sources of planning data, manpower information is explored for its usefulness in setting goals, determining labor market needs, curriculum content, occupational guidance, and job placement for local programs of vocational education. In addition, various research studies are briefly reviewed in examining the literature for the use of follow-up data in developing priorities and making evaluation studies of local programs. (SN)

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UTILIZING MANPOWER AND FOLLOW-UP DATA: A PERSPECTIVE FOR LOCAL VOCATIONAL EDUCATION PLANNING

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UTILIZING MANPOWER AND FOLLOW-UP DATA:

A PERSPECTIVE FOR LOCAL VOCATIONAL EDUCATION PLANNING

J. Marvin Robertson
Assistant Professor of Vocational Education
Division of Vocational Education
College of Education
University of Georgia
Athens, Georgia

ERIC Clearinghouse on Vocational and Technical Education
The Center for Vocational and Technical Education
The Ohio State University
1960 Kenny Road Columbus, Ohio 43210

1973

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The Center's mission is to strengthen the capacity of state educational systems to provide effective occupational education programs consistent with individual needs and manpower requirements by:

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FOREWORD

Local administrators are continually faced with planning and modifying programs of vocational education. This publication is intended to assist the local administrator in utilizing follow-up and manpower data. The author identifies manpower information which should be collected before planning broad program areas, selecting curriculum content, developing occupational guidance, maintaining job placement, and providing evaluation feedback. Four general methods of manpower forecasting are addressed: employer survey, extrapolation of trends, econometric techniques, and the job-vacancy-occupational-outlook approach. Several guidelines are suggested for assigning priorities to resource allocations.

The profession is indebted to J. Marvin Robertson for his scholarship in the preparation of this report. Recognition is also due John W. Struck, Pennsylvania Department of Education; and Roger Lambert, Black Hawk Technical Institute, Janesville, Wisconsin; for their critical review of the manuscript prior to final revision and publication. Wesley E. Budke, Assistant Director for Information Utilization at The Center, coordinated the publication's development. Alice J. Brown provided the technical editing.

Robert E. Taylor
Director
The Center for Vocational and Technical Education
ERIC Clearinghouse on Vocational and Technical Education

INTRODUCTION

This publication has been written to assist local administrators in utilizing available data to plan local programs of vocational education.

Certain assumptions of the author underlie the content and organization of the publication. These assumptions are:

1) It is appropriate for a local educational system to plan the vocational program that will be implemented in their service area.

2) Manpower information is an important--but not the exclusive--source of planning data.

3) Public educational institutions are only one of many sources of job skill acquisition in the United States.

4) Vocational education is an important function, among many appropriate functions, of local educational agencies.

Readers expecting a step-by-step method of translating data into programs will be disappointed. The intent of the author is to establish a perspective from which data can be utilized.

Planning comprehensive programs of vocational education for local systems has a new emphasis in recent federal legislation. It is hoped that this publication will assist local administrators in developing a sound basis for utilizing information in the planning process.

AN OVERVIEW

Manpower and follow-up information can be utilized in a continuing planning process by vocational educators. The type of data needed and the use of the data depends on the planning task and the target population.

The author has organized the publication around a series of planning tasks and the data that may be most relevant. Table 1 summarizes the manpower and follow-up information by planning task.

TABLE 1

Examples of Planning Tasks and Suggested Manpower Information

PLANNING TASK	TYPE OF MANPOWER INFORMATION
Selecting Broad Program Areas	Forecasting Employer Surveys Trend Extrapolation Econometric Techniques Job Vacancy-Occupational Outlook Target Population Characteristics
Selecting Curriculum Content	Occupational Analysis Task Inventory Job Functions Analysis
Developing Occupational Guidance	Occupational Information Work Values General Information about the World of Work
Job Placement	Entry Openings Hiring Standards Entry Barriers
Evaluation Feedback	Follow-up Studies

DEVELOPING PROGRAM GOALS

An old Chinese proverb says "If you don't know where you're going, any road will take you there." This proverb describes the condition of a local system attempting to provide vocational education without specific program goals that include detailed criterion questions and quantitative evidences to measure progress toward goal attainment. Manpower and follow-up data cannot give direction to the local administrator who has not defined the goals of the local program. The data may help the administrator establish goals.

Byram and Robertson (1971) have described a method of developing program goals and defining them with criterion questions and acceptable evidences. The goals are developed by staff, citizens, employers, and students at the local level. Questions of criteria, when answered by acceptable evidence, measure progress toward goal attainment.

The Delphi technique (D. Anderson, 1969; Pfeiffer, 1968) can be adapted to the local administrator's need to arrive at agreement on program goals. The Delphi technique is a low risk method of determining the priorities of the various publics that influence goals. The first step is the mailing of a questionnaire to leaders of the group or groups whom the administrator wants to involve. Each leader would list goals that he considers important for the local vocational program. The lists of goals are compiled and a copy returned to each leader for his ranking.

Results of the second questionnaire are used to develop a list of goals on which most leaders agree. A third questionnaire, containing the list of goals, is sent to ask for revisions with specific opinions to support the revisions. The final step is a mailing of the revised list of goals and a request for minority opinions. The Delphi technique reveals agreement on goals and specific areas of disagreement.

The local administrator may be faced with an overlapping and conflicting goal hierarchy. What is expected by federal legislation, state department sources, and the local board of education may be in actual conflict.. Young, et al. (1972) describe some of the problems encountered and a method of defining the goals of the various authorities to whom the local administrator may be responsible.

In the 1971 annual report of the Georgia State Advisory Council for Vocational Education, a set of goals was developed, criterion questions written, and quantitative evidence gathered (Robertson, 1972). The system developed is adaptable to local situations and provides a

framework for goal setting, planning, data gathering, and evaluation. It emphasizes the important ways that proper goal setting determine the pattern of data gathering and utilization.

Part of the methodology described utilizes manpower, planning, and follow-up data to imply what the goals of the program in fact are. If much of the data on the present program revolves around job placement of graduates in the occupation for which trained, then that is assumed to be a goal of the program. Administrators then ask two separate questions: (1) "How effectively is the program meeting that goal?" and (2) "Is that a proper goal for the program?" Proper planning is easier when the two questions are kept separate.

Comparatively few educational agencies have gone through the difficult process of defining broad goals. The process involves wide participation of internal staff plus consensus in the public sector and the educational community (Nyquist, 1969). These broad program goals should be stated in measurable operational terms rather than in glittering generalities.

PLANNING NEEDS AND DATA

The local administrator should be interested in using manpower and follow-up data for a variety of decisions. Typical questions revolve around the quantity and type of educational services that might be provided to the target clientele. Educators need to know about (1) the interests, aspirations, abilities, and aptitudes of students and trainees; (2) performance requirements in various occupations; (3) employer hiring standards; (4) occupational entry barriers, such as discrimination and licensing; and (5) existing sources of manpower (Shea, 1969).

The data can be weighed against the goals set for the local program and goal hierarchies of the local, state, and federal agencies. Needs of the target clientele can be assessed. A systematic procedure of setting priorities can then be used to allocate the resources of the local educational system (Young et al., 1972).

MANPOWER DEMANDS AND EDUCATIONAL NEEDS

Most local administrators would agree that some knowledge of long-term labor demand is important to decisions which begin or modify occupational training programs. Long-term projections may be useful primarily to make decisions as to broad areas of emphasis in the curricula. For example, rapidly changing or uncertain forecasts may indicate more general rather than specific skill training. Long-term projections may indicate that relative emphasis should be placed on broad categories of occupations such as distributive, health, or trade and industrial education (Shea, 1969).

The ideal local labor market information system should provide data on current and projected labor requirements by industry and occupation, describing each occupation in terms of job requirements, wages, mobility patterns, and working conditions. In addition, the ideal labor market information system should provide data on the current and projected manpower supply by skill, experience, education, and demographic characteristics.

A data framework that embodies not only the job itself, but also expresses the relationship of that job to others around it, would be of value to vocational educators using cluster concepts. Constellations of jobs with common training cores are closely related to the technical and economic factors which effect the structuring of jobs in our economy (Scoville, 1969).

Forecasting

The contribution of forecasting to planning vocational programs is not universally accepted.* Doubt stems from the inaccuracy of forecasts and the mis-allocation of funds that may result. According to Blaug (1967), the evidence indicates that forecasts beyond three or four years seldom fall within the 10 percent margin of error generally considered acceptable.

Local vocational administrators should recognize that forecasts of supply and demand fall short of preferred accuracy levels. However, the use of expert forecasts is generally better than the use of amateur forecasts, and use of relevant data will generally lead to improved

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*The author is indebted to Robert Young, et al. (1972) for the basic material on forecasting.

quality of forecasts. Forecast data is generally more accurate at national levels and least accurate at the local level. The local labor market data would be more useful for planning some local programs of vocational education. Accuracy will not be critical as long as vocational programs provide only a small fraction of the total labor supply.

Depending on how precise one wants to be, there are four general methods of manpower forecasting. A general understanding of the methods and their limitations can make the data more useful to local planners. The four methods are employer surveys, extrapolation of trends, econometric techniques and the job-vacancy-occupational outlook approach.

Employer surveys. Surveys of local employers are the most common manpower data used by vocational educators. The two kinds of surveys are the "Area Skill Survey" and the "Training Needs Survey." The former examines 50 to 150 occupations with selectively high levels of employment. The occupations generally require at least a year's training but less than the bachelor's degree. The "Training Needs Survey" is a simplified version that examines fewer occupations, limits the forecast period to one or two years, reduces the number of employers surveyed, and utilizes nonrandom selection of employers (Chavrid, 1966; Mehmet, 1965).

The area survey is relatively low cost, easy to administer, may provide estimates of requirements for several occupations rather quickly and places the responsibility for the quality of the data on the employer. The area survey has the advantage of opening communication between the school and the employer.

State funding agencies and legislation generally require the local educational agency to show a manpower need for each instructional curriculum, and the area survey is usually acceptable to them.

The Nebraska Research Coordinating Unit has developed a manual for determining educational needs by gathering and analyzing community data (Cromer, 1968). Smith and Thole (1966) base need for occupational schools on area surveys that transpose manpower data to the United States Office of Education occupational training codes (Wisconsin State Employment Service, 1969; 1971).

The U.S. Office of Education (USOE) and the U.S. Department of Labor (DOL) developed the publication Vocational Education and Occupations to systematically relate manpower data gathered by the Dictionary of Occupational Titles (DOT) classification code (U.S. Department of Labor, 1969c) to the vocational programs in the USOE Classification System. Groups of DOT codes with similar skill requirements are combined under a single instructional program.

The manpower information suggested or required in annual and long range local plans of vocational education is often derived from area surveys (Hilton and Gyuro, 1970; Bradon, 1970). The Model Cities survey conducted in the Denver metropolitan area is one example of a comprehensive local data collection utilized by several agencies to justify planned programs to funding sources (California Department of Education, 1968).

Trend extrapolation. The simplest forecasting of future employment is based on the assumption that trends in the future will be similar to trends in the past. Trend data is more easily obtained because it is historical; however, the past has not always been adequate to indicate future needs as evidenced by recurring manpower problems. Even so, in some cases, extending trend data into the future has been at least as accurate as more sophisticated and expensive methods (Mehmet, 1965).

Econometric techniques. The econometric forecasting approach utilizes economic and population projections and the industry/occupational matrix or the Bureau of Labor Statistics (BLS) matrix, and is the most sophisticated method in use. The Advisory Committee on Research to the U.S. Employment Service has recommended that the econometric approach replace the area skill survey as a source of manpower data for vocational planners (Young, et al, 1972).

The steps in generating forecasts are described by Young, et al. as:

1) Projection of the population by age, sex, color, and geographical distribution.

2) Projection of the labor force, by age, sex, color, educational level, and state.

3) Based on the assumption of minimal unemployment, an estimate is then made concerning future levels of gross national product, based on trends in productivity, hours of work, and consumer expenditures.

4) These estimates of final demand are then examined for their implications in terms of industrial output at both the final stage of production as well as among the intermediate and basic industries which provide the inputs to the final production process.

5) Given the final output expected from the various industrial sectors, estimates are then made of the manpower or occupational structure within each industry required to produce that output.

6) These estimates of occupational employment by industry, based on the industry/occupational matrix or the BLS matrix, may then be summed to provide the total estimated employment by occupation.

7) In addition to changes in requirements as a result of growth or decline in occupational employment, estimates are made of those leaving the work force through withdrawal, death, and retirement. These are components of future occupational need-growth and occupational losses are then summed to provide the estimate of new openings for labor force entrants.

Publications utilizing econometric techniques published by the U.S. Department of Labor should be helpful to local vocational planners. Tomorrow's Manpower Needs (U.S. Department of Labor, 1969a) projects the occupations by DOT code, and Occupational Manpower Needs; Information for Planning Training Programs for the 1970's (U.S. Department of Labor, 1971) classifies the forecasts according to instructional program.

Job vacancy-occupational outlook. This method compares the employment service listings of job openings unfilled for 30 days or more with the total number of unfilled openings to show persistent job openings. Reasons for difficulty in filling the jobs are categorized as shortage of qualified workers, low wages, working conditions, and other. The combination of persistent openings and the reasons for the openings provide trend data to identify instructional programs that could be established.

Forecasting and Planning

The accuracy and relevance of manpower forecasts are meaningless to vocational administrators unless the data is utilized as a planning input. Decisions must be made to establish, terminate, and modify instructional programs for occupational training. Manpower forecasts help identify the occupations that are most likely to provide employment for graduates. The up-to-date vocational administrator will use manpower forecasts as one important data input for planning. He will neither ignore manpower needs nor base decisions solely on manpower needs.

EDUCATION AND THE LABOR MARKET

In the foregoing, the labor market was discussed as if the educational system responds to changing job requirements. Changes in employment opportunities were regarded as the independent variable and the educational system's response to those changes as the dependent variable. The opposite is frequently true. Rising levels of educational attainment have caused shifts in employment requirements. As a larger percentage of the blue collar labor force has attained high school graduation, increasing numbers of jobs require high school graduation for employment.

Supply tends to create its own demand. To cite an example, a sizable increase in the supply of psychiatrists and other mental health personnel would encourage the establishment of mental health centers (Lecht, 1969).

Job development has become a major function of several of the programs for the disadvantaged. Older workers, very young wage earners, nonwhites, farm laborers, and marginal farmers are in groups with heavy concentration of low levels of skill and education. Occupational programs to improve the earning power of these individuals necessarily concentrate on the unique personal needs. The vocational administrator who expects to serve this population will, as curricula is designed, concentrate first on the individual's need for employment rather than on the employer's need for skilled manpower.

MANPOWER DATA AND CURRICULUM CONTENT

Whatever the occupational area selected for inclusion in the educational system and whomever the target population, curriculum in vocational education stems from the world of work. The curriculum planner may use a detailed task analysis of a single entry job, a cluster approach, or emphasize vocational development of the individual. In each instance, reality and relevance stem from the day to day world of work. It is this relationship between the "what" and "how" of teaching and the demands of employment that provide the realistic purpose which characterizes vocational and career education.

Mehail (1971) identifies occupational analysis as the first phase of curriculum development in the Milwaukee Area Technical College. The analysis identifies the on-the-job performance requirements and sets the

framework within which all subsequent steps of the systems process occur. Frantz (1971) describes the development of cluster curricula through a task inventory that identifies job entry tasks. The Oregon cluster approach is based on occupational analysis. Over 350 separate occupations were analyzed to determine the representative knowing and doing skills for the electrical-electronics cluster curriculum. (Oregon Board, 1969). These were reduced to five key occupations representative of the total cluster. The curriculum was derived from an analysis of the specific tasks common to all five and an analysis of the time devoted to each general category of tasks.

The behavioral objective approach of Mager and Beach (1967) begins with a job oriented view so that only the most relevant subject matter and learning activities are built into the course. The first step is to locate or write a job description. Next, a task analysis is developed. The target population is defined, objectives written, and evaluative measurement specified.

Fine and Wiley (1971) utilize the functional job analysis technique in management training, designing curriculum, and developing para-professional entry jobs in the welfare field. Whether managers can meet their responsibilities fully depend upon their developing a means of insuring accurate, consistently interpreted information about what workers do and a means of realiably comparing the skill and knowledge requirements in a wide range of jobs.

The Handbook for Analyzing Jobs (USES, 1972) includes job analysis uses, concepts and principles; procedures for conducting job analysis; organizing to conduct job analysis and verification of job analysis. Through the concepts and techniques outlined, current and comprehensive job information and worker requirements can be acquired for ongoing and future occupational programs.

A "function of business" approach to building curriculum from world of work data has been developed by Clark and Meaders (1968). The teaching content is derived from the business functions and the relationship between functions rather than from isolated job task analysis.

The curriculum approach that best fits the local situation is a local planning decision that will depend, in part, on the local goals, the target population, and educational philosophy. Each approach depends on data from the world of work.

Goldstein (1969) suggests that contacts with local industry which have been established by vocational education personnel are essential to keep curricula up-to-date. Expansion of training or changing the kinds

of occupational programs is only one concern of educational planning personnel. In many occupations the content of the training must be adjusted to changing on-the-job skill requirements.

MANPOWER DATA AND OCCUPATIONAL GUIDANCE

A goal established for vocational education that is receiving increasing attention is the provision of occupational or career information to all students. Emphasis on career education and the process of individual vocational development has expanded the information and need vertically to include all individuals from the first grade through continuing education. Bottoms and O'Kelley (1971) indicate the student needs, understandings, and skills that include the occupational areas, education and occupational decisions, economic and social values of work, and psychological and sociological meaning of work.

Structure of the work force, occupational requirements, trends, wages, working conditions, technological change, women in the work force, and employment patterns for minority groups are a few of the things about which one needs information to guide students. Man's wisdom is a function of his ability to learn from available information and to adjust to new situations uncovered by the information. Career guidance, in our democratic society, is the process of exposing the person being guided to relevant occupational information so that he can make informed career decisions (Rosen, 1966).

Career Education expands the need for information about the world of work into each classroom. If elementary teachers and teachers of academic subjects are to relate instruction to work, they will require an increased understanding of occupations. The teachers in Cobb County, Georgia utilize information from a Resource Persons File compiled by career development specialists. Future students should be able to make career decisions based on their experience, exposure, and knowledge. Youngsters should be more aware of the occupational possibilities available to them before they select from the educational possibilities (J. Smith, 1972). It means that educators at all levels--vocational and academic--need to utilize more manpower information in the total educational system.

MANPOWER DATA AND JOB PLACEMENT

Placement of the graduate in the labor force where the marketable skills are utilized is the prime objective of vocational education. Both industry's need for skilled workers and the individual's goal of satisfactory employment are met by placement. Yet, the preponderance of reports show that few public schools have adequate job placement programs. The great majority of vocational-technical graduates rely heavily on family, friends, and direct personal application to obtain first jobs.

Kaufman and Lewis (1968) report that 30 percent of the men obtained jobs by direct application; 29 percent by family or friends; 24 percent by school placement; 17 percent by employment agency, newspaper, or other means. The percentages for women were similar, but women made more use of employment agencies. In general, the transition between school and the first job is informal and unstructured with the individual's immediate environment a major factor in determining where he will seek employment.

Jeanroy (1969) studied needs for and made recommendations for placement services of two year college-level institutions. The study reports that of 132 two-year colleges sampled in 14 states, almost half (48 percent) do not have institutional job placement service. It is easy to see why the aggressive job placement service of private, profit-making vocational schools attracts students.

The Training and Technology (TAT) program achieves placement of over 95 percent in 170 different industrial occupations through credibility with employers and knowledge of the work force ("Training and Technology," 1972). From midpoint in the training cycle on, many trainees start to ask about the placement rate of graduates in the previous cycle. Trainees watch the record as it builds up in placements, ask about where people go and how much they make. It is reasonable to assume that the good placement record does much to allay the anxiety of the trainees and to contribute most positively to holding power.

Placement service can be built effectively around skill surveys of the school service area, contact with personnel directors in local business, contact with advisory councils, and activities of coordinators of work experience and cooperative education programs. The placement service can serve as the basis for a sound follow-up system.

UTILIZING FOLLOW-UP INFORMATION

Data from manpower sources about the characteristics of the target population provides input for planning. Follow-up--and the larger area of evaluation--provide the necessary feedback information to determine if the program is working as planned. The assumption is that information and opinion from former students could be of assistance to determine strengths and weaknesses of the instructional program. It is hoped that such findings would lead to improvements in all aspects of the vocational education system.

Some specific purposes for which follow-up studies have been conducted are listed by Byram and Robertson (1971):

- To obtain information and value judgments regarding the educational experience previously received in terms of its preparation of the individual for the work in which he is engaged.

- To determine the impact of training programs on present job performance.

- To identify the kinds of vocational experience and training to provide for present and future students in the light of their occupational history.

- To determine the adequacy of preparation for continuing education in post-high school and post-community college or technical institutes.

- To determine the mobility of former students.

Information gathered in follow-up studies should be of more value to planners if the group included in the study consists of all individuals in the particular educational system's target population. College bound students, graduates, drop-outs, and those choosing general programs each have something of importance to say about the vocational program.

Data from follow-up studies becomes useful when it is related to specific program objectives. When one initiates a follow-up study, one should begin by identifying the program objectives to be evaluated, develop criterion questions to measure that objective, and identify quantitative evidences to answer the criterion questions. The follow-up instrument is then designed to gather the evidences identified. Studies that gather much data without a specific purpose leave the planner with much information and little knowledge.

Follow-up studies, if carefully planned and executed, can provide an important information base to educational planners and administrators. Where coupled with appropriate other data, follow-up information can point the way to improved decision-making on questions of priorities among types, levels, and fields of education and questions of resource allocation.

A source of information related to follow-up studies which is often overlooked is the study of the current workers in an occupation including the training and the means of entry into the occupation. Occupational skills are acquired in many ways and some occupations rely more than others on institutional training. A surprisingly large portion of the labor force reports no formal training of any kind (Miller, 1968). Administrators may be wise to identify occupations requiring formal training for inclusion in vocational programs.

DEVELOPING PRIORITIES FOR RESOURCE ALLOCATION

Resources available to allocate to vocational education are, as a practical matter, limited. Reasons for gathering, analyzing and utilizing manpower and follow-up data include developing priorities for allocating the limited resources, and increasing the efficiency of resource utilization.

The annual and long range plan for vocational education required of each local system by the 1968 Amendments to the Vocational Education Acts of 1963 require the setting of some priorities. The opportunity is inherent in the process for the logical planning and setting of priorities by the local system.

Young, et al. (1972) have developed a system of setting program priorities by weighing specific measures related to some essentials for operating a program. The system gives the local administrator a method of setting priorities logically from a sound data base. The Curriculum Priority Matrix identifies and defines nine criteria--net openings, entry wages, seniority wage, entry requirements, job satisfaction, student interest, academic performance, serving disadvantaged, and curricular cost. The matrix is one method of using data and integrating identified program goals and objectives in the planning process.

Byram and Robertson (1971) outline a system of identifying local program needs by utilizing information about those to be served, the

community, and the world of work. The data is analyzed in relation to program objectives and school resources to develop a proposed, ideal program. The existing program is compared to the planned program and steps are developed or priorities are set to proceed from existing to planned programming.

Oregon has developed an extensive manpower data base to plan programs around occupational clusters. The development of data collection devices, data analysis, and utilization of the data are described in Oregon Statewide Study of Systematic Vocational Education Planning, Implementation, Evaluation: Phase I (Watson, et. al., 1965).

The Florida State Department of Education (1972) has published guidelines for comprehensive local planning. The guidelines indicate that appropriate long range planning will:

- Provide procedures by which pertinent information can be assembled, analyzed, and utilized to determine needs.

- Provide mechanisms for identification of goals and objectives and establishment of priorities.

- Include procedures by which alternative courses of action, based on established priorities, can be identified, and the implications or consequences of each determined.

- Make possible orderly and systematic procedures for achieving purposeful changes as needed.

- Include provisions and procedures for the implementation, evaluation, and possible modification of the change.

Utilization of manpower and follow-up information for planning vocational programs can be improved by beginning with a well-defined set of objectives and goals for the local educational system. The goals tend to define the kinds of data that will be needed to make logical decisions. Some parameters on the kind of data needed will help the planner find some order in the maze of data available. The planner should keep asking himself what decisions he would change if more data or different data were available. If no change is indicated, no more data is needed.

A SUMMARY STATEMENT

In the introductory statement, it was indicated that those expecting a step-by-step method of translating manpower data to program plans would be disappointed. Hopefully, most of the readers will accept the author's view that planning is a continuing and complex task and no category of data can be automatically translated into appropriate plans.

Suggested elements of a planning system that could utilize data include:

- Specific, measurable program goals.
- A planning process that includes specific tasks.
- Identified types of desired information.
- Data sources.
- A continuing data collection system.
- A linkage of decisions and data.
- Follow-up data and other evaluative feedback.
- A specific set of criteria for setting resource allocation priorities.

Planning and operating a local program of vocational and career education that will meet the needs of the society and of the individuals in that society is a complex challenge which will require the competent vocational educator to constantly plan, evaluate, and modify the local program. A continual flow of appropriate manpower and follow-up data, properly utilized, will continue to be essential.

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