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ABSTRACT

This manual is a resource of ideas and suggestions for comprehensive statewide planning of vocational education. It is directed toward both experienced and inexperienced vocational education planners. The data analysis and display techniques presented are useful for producing information for developing state plans and for communicating data-based information to planners, administrators and to other persons who contribute to, react to, or review vocational education planning efforts and documents. The manual includes information which can be used in carrying out three planning tasks: (1) formulating program goals and objectives: (2) planning the allocation of resources for the achievement of goals and objectives; and (3) monitoring and evaluating a plan. The uses of demographic and related information in vocational education planning are given special treatment. Topics include use of demographics and census data for identifying economically depressed areas, areas of high unemployment, and planning regions, and use of it for distribution of funds according to economic and social factors or student accessibility. Examples are also provided of how data analysis techniques and display procedures can be applied to vocational education planning. General concepts are discussed (e.g., sample vs. population and descriptive vs. inferential statistics) as well as specific analysis methods (e.g., multiple enumeration, relationship analysis, and curvilinear trends and regression) and such display techniques as tabular, graphic, line graphs, pie and column charts, pictorial displays, and statistical maps. (PV)

RESEARCH AND DEVELOPMENT SERIES 164

SELECTING, ANALYZING, AND DISPLAYING PLANNING INFORMATION

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Foreword

This manual is a resource of ideas and suggestions about how to generate and communicate information needed for developing responsive state plans for vocational education. The content of the manual is directed to both inexperienced and experienced vocational education planners and to other persons who are concerned with vocational education planning.

The manual was developed by the National Center for Research in Vocational Education under a contract with the Bureau of Occupational and Adult Education, the U.S. Office of Education. Invaluable assistance and advice for its content and preparation were provided by Mr. Paul Manchak, USOE project officer, and field site state staff persons in Colorado, Oklahoma, Florida, and Wisconsin. Recognition is also due to consultants who contributed and reacted to the content of this manual.

Significant contributions to the final product were also made by co-authors Harold Starr, Clyde Maurice, Michael Black, Paula Keller (Oklahoma), and other staff of the National Center.

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CHAPTER I

GENERAL INTRODUCTION

Purpose of the Manual

This manual is a resource of ideas and suggestions for promoting improvement in comprehensive statewide planning for a responsive vocational education through more effective use of data analysis and data display techniques. The data analysis and display techniques included in the manual are those which are useful for producing information for developing state plans for vocational education, and for communicating data-based information to planners, administrators, and to other persons who contribute to, react to, or review vocational education planning efforts and documents.

The manual also includes information which can be used in carrying out three planning tasks: a) formulating program goals and objectives; b) planning the allocation of resources for the achievement of goals and objectives; and, c) monitoring and evaluating a plan. The uses of demographic and related information in vocational education planning are given special treatment. Examples are also provided of how data analysis techniques and display procedures can be applied to vocational education planning.

Audiences for the Manual

The content of this manual is designed to be useful to three audiences:

- vocational educators who are inexperienced in vocational education planning or in the use of data analysis and data display techniques applicable for vocational education planning

- experienced vocational education planners who might find useful ideas about planning information, data analysis, and display techniques which they can incorporate in their planning efforts

- non-vocational educators who contribute to, review, or react to vocational education planning who want to gain a greater awareness of the difficulties and complexities faced by vocational education planners in developing and applying a knowledge base in planning for a responsive vocational education.

Chapter II, Applying Demographic Information, focuses on the uses and sources of demographic information in the development of state plans for vocational education. The reader will find a discussion of the uses and sources of employment information in the development of state plans in the National Center publication, "Developing State Plans for Vocational Education."

Chapter III, Applying Data Analysis Techniques, addresses the problem of analyzing the best available data in order to generate meaningful informational summaries which can be useful to both planners and decision-makers. Alternative data analysis techniques are presented for dealing with a variety of planning tasks and subtasks. There is no intent to make statisticians out of those who read this chapter; instead, the intent is to create an awareness of the range of analysis techniques which can be brought to bear to efficiently generate meaningful and usable information from data.

Chapter IV, Communicating Analyzed Data Through Effective Use of Data Displays, describes data display techniques which can be used to effectively communicate the results of analysis of data to planners and decision-makers. One can assemble appropriate data, analyze them, and produce a comprehensive information base for planning purposes which can meet the needs of planners. However, unless such information is displayed in a manner which effectively communicates to its intended audiences, the efforts of generating information will be lost. This chapter is designed to create an awareness of alternatives available to planners for effectively displaying data summaries.

Topics Found in the Manual

- planning for a responsive vocational education--definition of terms
- the need for better use of data analysis and display techniques for planning
- selecting information useful for vocational education planning

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Planning for a Responsive Vocational Education-Definition of Terms

Planning for a responsive vocational education implies a concern for the adequate and timely provision of vocational education to all its clients and recipients in the context of changing circumstances. A review of federal legislation enacted by Congress since 1963 points up a number of major challenges for vocational education planning if such planning is to be responsive to national purposes and expectations for vocational education. These major challenges can be summarized as follows:

- the vocational education system must be more responsive in achieving an optimal balance and accommodation between the aspirations, interests, and needs of peop' for education, for work, and for the work skill requirements of the nation

- the vocational education system must be more responsive to broad social goals, especially with regard to improving access and equity to its instructional programs and supportive services by minorities, persons of both sexes, the disadvantaged, and the handicapped

- the vocational education system must be more responsive to changing work world requirements by building a more effective program improvement capacity

- the vocational education system must be more responsive in strengthening, animating, and assuring a more viable and relevant public school system

- the vocational education system must be more responsive to the national concern that it be an effective and articulated dimension of a comprehensive work-force delivery system

The performance of these enormous responsibilities is highlighted by numerous complexities such as the scarcity of resources, dwindling enrollments in some sectors, constraints in the use of funds, competition from other training sources, technological changes, fluctuations in educational and social priorities, and many other factors which demand attention if vocational education is to be adequately responsive. The Education Amendments of 1976 clearly prescribe statewide, comprehensive planning as the prime mechanism for achieving the national purposes and expectations of vocational education. Planning is a tool for meeting needs, setting new directions, and effecting desired changes. Comprehensive planning is concerned with a total system and all of its relevant audiences.

The development of comprehensive statewide plans which are responsive to national purposes and expectations for vocational education requires an extensive knowledge base about a state's vocational education system and the context within which it operates. An adequate knowledge base for developing state plans for vocational education is derived from three sources:

- opinions and judgments solicited from concerned persons, groups, and agencies within and outside of the vocational education system
- outcomes of an analysis of the vocational education mission, the policies which affect the delivery of vocational education, and the effects of structural and functional relationships and coordination mechanisms between vocational education and other education and training systems
- information which is produced from analyzing quantitative data

This resource focuses on the last of three knowledge base sources.

The Need for Better Use of Data Analysis and Display Techniques for Vocational Education Planning

The Vocational Education Act of 1963 provided substantial federal direction and assistance to the states for the administration and operation of vocational education programs. Under this federal legislation, the states were directed to engage in comprehensive planning as a means of assuring that the purposes of the act would be achieved. The nature and scope of state planning has been reaffirmed and made more explicit in the Vocational Education Amendments of 1968 and in the Education Amendments of 1976.

One of the directives for planning and evaluation under the Vocational Education Act of 1963 was that the states should develop state plans for vocational education to be submitted to the Commissioner of Education for approval before receiving federal funds. In order to ensure that program offerings would be realistic in the light of actual or anticipated opportunities for gainful employment, states were required to develop program plans only after periodically reviewing existing vocational education programs and manpower needs and job opportunities. The 1968 Amendments to the Vocational Education Act of 1963 directed the states to engage in more detailed planning and evaluation of state programs, and the U.S. Office of Education (USOE) prescribed new rules and regulations for developing state plans. Until 1976, state plans for vocational education and the USOE vocational education reporting system were the basic sources of evidence about the status, quality, effectiveness, and impact of all federally assisted vocational education programs.

A General Accounting Office report to the Congress, "Training America's Labor Force: Potential, Progress, and Problems of Vocational Education," was issued in 1972. This report pointed out that evaluation and planning of vocational education were seriously handicapped by a lack of management information. Problems associated with information being incomplete and inaccurate were described in the report, and a recommendation was made that USOE should actively assist states in their efforts to improve management and information system capabilities.

A subsequent General Accounting Office (GAO) report to the Congress in 1974, "What is the Role of Federal Assistance for Vocational Education?" focused on the use of information for comprehensive planning by state divisions of vocational education. The report found that:

- the Congress has observed repeatedly that information about vocational education is inadequate for the purpose of formulating public policy and ascertaining whether current programs are working effectively ...

- states administering programs authorized under VEA generally gather only that quantitative information required by OE ... data collected to satisfy OE requirements do not contain information on the extent and type of need for vocational education on the part of individuals served or potential participants, nature and level of actual instructional programs, costs of specific programs, or results of programs in any terms other than initial placement ... or ... for determining the extent to which state and local efforts actually had impacted on the handicapped, the disadvantaged, or those in economically depressed areas ...

- data that would be helpful in planning is unavailable, inadequate, or underutilized.

As a result of its findings, the GAO recommended to the Congress that the Secretary of HEW should:

- develop with the states an improved approach to planning which will better meet state needs as well as provide information necessary to monitor and evaluate adequately federal program expenditures ...

- increase efforts in the development of vocational education information systems that will provide data for comparative analysis, and continuously review the use of that data to improve vocational programs.

A recent report by Starr (1977) reviewed management information systems for vocational education currently in place in the states. That study found that only six of the 47 states surveyed had adequate or near adequate data bases for generating information for comprehensive planning purposes. Data that were available within the states, more often than not, were used for reporting than for planning.

Two other recent reports (Drewes, 1975; Stevens, 1976) discussed problems associated with the underutilization of occupational information in vocational education planning by state and local educational agencies. Major reasons given for the underutilization of occupational information were: a) distrust by vocational staff of the accuracy and usefulness of occupational information; and, b) lack of technical expertise by state and local planners in effectively utilizing existing occupational information.

The need for states to use data-based information for program planning has been made all the more urgent by the passage of the Education Amendments of 1976. This recently enacted federal legislation mandates that an extensive base of information be used by the states to plan, evaluate, and account for the use of federal funds for vocational education programs. For example, this legislation prescribes: a) a National Occupational Information System which shall include data on occupational demand and supply based on uniform definitions, standardized estimating procedures, and standardized occupation classifications which states must use (Section 161, P.L. 94-482); b) a National Vocational Education Data Reporting and Accounting System which will require states to provide data about student characteristics, staff, programs, allocations, expenditures, and the outcomes and impact of vocational education (Section 161, P.L. 94-482); and, c) Occupational Information Coordinating Committees in each state which are charged with the responsibility of implementing an occupational information system to meet the common needs for planning and operation of vocational education programs and training programs under the Comprehensive Employment and Training Act.

In spite of the mandates of the Education Amendments of 1976 that direct states to use data-based information in planning, states continue to be uncertain about how to make more effective use of information to achieve a more responsive vocational education. This state of affairs has been summarized by Wilson (1975):

> The vast complexities of administering a vocational education program at the state level suggests the need for a range of information which is current, accurate, immediately available, and in a form that can be understood and used by administrators. Unfortunately, such information or service is not currently available on any meaningful scale for the vast majority of state agencies.

In developing this document it was assumed that good information-based planning is a necessary prerequisite for the development of state plan decisions which are responsive to national expectations and purposes.

In summary, there is a compelling need to improve vocational education planning through the use of data-based information, and to provide decision-makers with information in a form which can be used and understood. To do so requires that data which are available must be appropriately analyzed so that information which is produced is relevant to the planning tasks and decisions which must be performed in developing a plan. In addition, information which has been produced through the use of data analysis techniques must be visually displayed in ways which communicate effectively the usefulness of the information for planning and decision-making.

Selecting Information Useful for Vocational Education Planning

A review of the literature dealing with vocational education planning points up the fact that no standard set of information is used by the states for the purpose of vocational education planning. The use of different combinations of information by the states is inevitable in spite of the fact that the states share common planning interests and produce state plans in compliance with the same federal requirements for their preparation. States are, after all, bound to perceive differences in the applicability and availability of information for planning. There are also differences among the states in the resources available to them to plan, collect, and process information for planning.

In spite of differences among the states in the information they use for planning, there are also numerous commonalities in the information they do use. To a considerable extent the provisions of the Education Amendments of 1976 (Amendments) are largely responsible for these commonalities. The Amendments prescribe: a) the minimum kinds of information which all states must use in preparing state plans for vocational education; b) the establishment of a Vocational Education Data System which requires all states to have a basic core of information available for reporting and accountability purposes; and, c) occupational information systems which will meet common needs for planning of vocational education programs (and of administrating agencies under the Comprehensive Employment and Training Act).

A review of state plan documents and the Amendments and judgments of persons familiar with vocational education planning were used as a basis for deriving information items which have varying degrees of usefulness for planning goals and objectives, allocating resources, and monitoring and evaluating outcomes of a state plan for vocational education. These information items and their perceived importance to a group of state and local vocational educators are found in Appendix A.

The information for planning found in Appendix A is produced by variously combining different kinds of economic, educational, demographic, and employment data. A number of data elements which have been used to produce information found in Appendix A are listed in Appendix B.

For those planners who are concerned with computerized management information systems for producing information useful for planning, the latest version (2.0) of the data base definition and accompanying data base diagram which have been developed for the National Center's Management Information System for Vocational Education (MISVE) are found in Appendix C. The data base definition contains data elements which can be combined and manipulated to produce information useful for planning and for responding to the federal Vocational Education Data System. MISVE utilizes a commercially available generalized data base Management System, SYSTEM 2000. The use of a sophisticated data base manager permits rapid and efficient access to data for data analysis purposes.

CHAPTER II

APPLYING DEMOGRAPHIC INFORMATION

Introduction

The demand for vocational education, reduced to its simplest form, is a function of two variables: society's demand for labor and the public's demand for training. One purpose of the planning role is to determine the optimum mix of instructional programs and enrollments to satisfy this dual constraint. It is neither efficient nor fair to train individuals for jobs unless there is a sufficiently high probability that appropriate employment can be obtained in a reasonable amount of time. This chapter addresses the second constraint--the public's need for vocational training.

The First Step

The first step toward integrating demographic information into the planning process should be the identification of the specific demographic information which will be relevant to planning vocational education. As a start toward identification, it may be helpful to write out a series of questions asking how different regional and population factors are related to the need for vocational education. An example of such questions is found in Figure 1.

After compiling as thorough a list as possible, the planner should begin to identify the information elements required to answer each question. Items might include sex, race, median age, age distribution, median education, median family income, labor force participation and unemployment rates, number of single heads of households with and without dependent children, and number of families receiving federal assistance. In deciding which elements to collect, the following criteria may be helpful: a) frequency of use; b) applicability to the most basic questions; and, c) ease and expense of compilation. Applicable information should be expected to vary from state to state, and to some degree, from time to time within any one state.

FIGURE 1

QUESTIONS FOR IDENTIFYING DEMOGRAPHIC INFORMATION

Geographic Factors

- Do geographic, sociological, or cultural barriers to vocational education exist in certain areas?
- How does population density impact on vocational service?
- How are the established commuting patterns related to the location of vocational programs?
- What impact does the magnitude and direction of migration have on vocational education?

Population Factors

- How does the sex, race, and age distribution of the overall population compare with the distribution of enrollments in vocational education by sex, race, and age?
- Which groups aggregated by sex, race, or age are

    . . . the poorest?
    . . . the most likely to experience unemployment?
    . . . the most mobile?
    . . . the most likely to drop out of school?

- What part of the population is disadvantaged or handicapped?
- What characteristics distinguish migrants from natives?

Economic Factors

- Which areas or groups exhibit the greatest economic need?
- How does ability to pay differ between regions and counties?

The next and perhaps the most difficult task is to determine the best sources for acquiring the desired demographic information and accompanying data. Planning takes place in a world which has recently experienced, and not yet adjusted to, an information revolution. We are bombarded with statistics (data) which often as not support conflicting theories and an accompanying tidal wave of tables (a good share of which we ourselves have produced) enumerating more data than we can assimilate. Yet when planning groups convene, they are likely to experience a void of readily usable data.

Persons with planning responsibilities which involve the use of demographic information want to canvass the most obvious resources of such information: a) other state and federal agencies; b) census publications; c) other regional and county planning units; d) employment security commissions; e) university research units; and, f) prepared lists of relevant periodicals. The useful miscellaneous materials gathered at professional meetings, received through the mails, or acquired directly should be noted and filed for future reference. In addition, a list of "contact" people in local, state, and federal agencies might be developed as leads to locating specific demographic information.

Using Demographic Information in Prioritizing Applications and Distributing Funds

The Education Amendments of 1976 (Amendments) require direct use of demographic data for two different planning subtasks. One subtask is prioritizing local applications. In this instance, the Amendments state that priority must be given to applicants who, among other things, are located in economically depressed areas and areas of high unemployment. The other subtask is distributing funds to local education agencies and other eligible recipients. In this instance, the Amendments stipulate the inclusion of economic, social, and demographic factors relating to the needs for vocational education among the various populations and areas of the state. The two most important factors mentioned in the Amendments are relative financial ability to provide the resources necessary to initiate or maintain instructional programs, and relative concentration of low income families or individuals. These two purposes under the Amendments require the use of demographic information to describe both specific target populations and geographic areas.

Demographic Information for Identifying Economically Depressed Areas

Although a number of interacting and more complex factors might be used to identify economically depressed areas, per capita income is considered to be the most reliable, the most readily available, and the best overall indicator of a region or population group's economic well being. General Social and Economic Characteristics (by state), a publication of the U.S. Bureau of the Census, lists per capita income by county and for cities with over 2,500 population.

Although it is tempting (and often acceptable) to use county data, planners should recognize that significantly different economic circumstances may exist within an area as small as a county and poverty pockets need to be identified specifically when possible. County data may be particularly misleading in the case of a county with a large, prosperous metropolitan population center, driving up per capita income sufficiently to mask the severe needs of smaller contiguous areas.

Other frequently used economic indicators include median and mean family income, median and mean individual income, percent of families or individuals below poverty level income. These information items and data associated with them are also displayed in publications of the U.S. Bureau of the Census.

The Use of Census Data to Produce Information for Planning

Data reported by the U.S. Bureau of the Census have a number of definite advantages: they are well documented; they are inexpensive to acquire; and they are organized and presented in concise tabular form. Census generated data are ordered by different regional classifications as well as by different population characteristics. The data's most obvious deficiency is the ten-year time span between publications. Some updated data are available annually, but it is somewhat more difficult and expensive to acquire. Although U.S. Bureau of the Census publications offer a considerable array of aggregated data, in some instances, the specificity desired may only be obtainable through use of special computer tapes prepared by the Bureau, a practice which is yet more expensive and requires a greater level of technical knowledge. Even then, Census data will seldom coincide with school district data--the level at which vocational planning begins and ends. However, demographic data estimated by school districts are available from the National Center for Educational Statistics. These data are available on computer tape for most of the school districts in the United States, but are generally not available for small, rural districts.

Demographic Information for Identifying Areas of High Unemployment

Unemployment (and employment) data are not new to planning for vocational education. The U.S. Department of Labor has historically reported unemployment rates. These rates are published monthly in Employment and Earnings.

There are some common misconceptions regarding what is typically referred to as "the" unemployment rate. The unemployment rate is actually a composite of several unemployment rates (typically published individually, at least annually, and at least at the state level) including the rate for prime-age male workers, young workers, older workers, minorities, and women. Furthermore, the method of calculation has historically varied more than one would optimally want for consistent trend analysis. The overall unemployment rate (usually reported by county) is a very visible piece of data and one subject to substantial pressure for revision. It is suggested that planners check periodically to determine if any changes have been made in the methods used to gather or calculate unemployment rates which would impact significantly on the interpretation and use of this statistic.

Planners also need to consider the probable underlying causes for chronically high unemployment. For example, chronic unemployment might be the result of deficiencies in aggregate demand or the result of structural changes in the work place or labor force which impact disproportionately on selected segments of the population. The causes of chronic unemployment have far reaching policy implications for vocational education. In the first instance, deficiencies in aggregate demand call for fiscal and monetary policy, not educational opportunity. In the case of structural changes in the work place or labor force, increased training, mobility incentives, and counseling are called for. Some information on long-term unemployment is available and may be used as a crude indication of structural causation. In addition, low demand for human resources may call for eliminating or reducing the number of vocational educational instructional programs for regions which exhibit chronically high unemployment due to a deficiency in aggregate demand.

Applying Demographic Data to Prioritize Applications

After determining the appropriate kinds of information which serve as indices for defining economically depressed areas and areas of high unemployment, the planner must develop a mechanism for assigning priority to applications. Perhaps the simplest mechanism is the use of index numbers to applicants on selected characteristics.

Suppose, for instance, that information about economically depressed areas and areas of high unemployment are restricted to per capita income and unemployment rates by county; and suppose further, that these characteristics are selected for ranking applicants. A range in per capita income can be determined first by subtracting the lowest value of per capita income from the highest value. An arbitrary (but sufficiently discriminating) number of intervals is then chosen, and an index number is assigned to each interval as illustrated in Figure 2, below.

FIGURE 2

INDEXING PER CAPITA INCOME

Less than $2000	- 5
2001 - 3000	- 4
3001 - 4000	- 3
4001 - 5000	- 2
5001 - 6000	- 1
Over $6000	- 0

A similar kind of indexing scheme can then be developed for unemployment rates, and even a third index can be developed which gives priority to programs for new and emerging occupations. It should be remembered that all categories of highest priority should be at the same end of the indexing scale. Hence, for the examples mentioned, the lowest category of per capita income, the index for the highest unemployment rate, and programs that are new and emerging will have the highest ranking in their individual scales.

A composite index can then be computed by summing the three individual indices. Applications are then ready to be rank-ordered by summing the applicants standing on each of the three characteristics in descending order (for the example shown). To plan for meeting long-range needs, the planner may follow the same procedure for all eligible recipients and include the appropriate supply and demand projections to build a long-range plan by region (county or place) and program area.

These indices and their components are at an ordinal level of measurement. The original interval properties of the measures have been destroyed by the assignment of rank-order indices. Although this procedure loses specificity, it gains in simplicity.

Although the above procedure is one of the simplest and most commonly used, it would be possible to devise more sophisticated scaling techniques. It is questionable, however, whether the potential gains would be worth the cost and effort.

Distribution of Funds According to Economic, Social, and Demographic Factors

The Education Amendments of 1976 specify that economic, social, and demographic factors be used to distribute federal vocational education funds according to the needs for vocational education among populations and areas of the state. The question remains: what economic, social, and demographic factors are appropriate?

Relative financial ability. According to the Amendments, relative financial ability of recipients is to be a weighted factor in a formula for the distribution of federal vocational education funds to local education agencies and other eligible recipients. In the case of local school districts, ability to pay might include such information as the district's assessed valuation and the rate at which it is taxed. These two pieces of information should be available from the state department of education or from the state's Bureau of Taxation. Since assessed valuation is frequently related directly to the population of the district, it is desirable to identify some common denominator to compensate for differences in population. Although total population is the most obvious common denominator, school enrollment may be a better common denominator to use in calculating a district's relative financial ability.

Relative concentration of low-income families. The relative number or concentration of low-income families or individuals is also designated in the Amendments as a weighted factor to be considered in the distribution of funds to local educational agencies. Again, the Census population, General Social and Economic Characteristics, is a useful source of data about low income families and individuals.

Higher than average costs. A third weighted factor, "the relative number or concentration of students whose vocational education imposes higher than average costs," is specified for eligible recipients of federal vocational education funds other than local education agencies. These data should most practically be gathered on the application itself.

Other demographic factors. Other economic, social, and demographic factors may also be included in a formula to assure that funds are distributed according to relative need. The indices previously developed for the incidence of poverty and unemployment relate directly to need for vocational training and can easily be integrated into the funding formula. Other possible demographic elements are listed below.

Element	Source
Disadvantaged and Handicapped Limited English-Speaking Ability	Vocational Education Data System/State Vocational Rehabilitation Agency/Private Agencies Serving these Groups
Population Density	Census
Single Heads of Households	Census
Aid to Dependent Children	Census/State Welfare Department
Racial Minorities	Census
Dropouts (priority for cooperative programs)	State Department of Education
Youth Unemployment (priority for cooperative programs)	State Employment Security Agency
Current Vocational Offerings	State Division of Vocational Education

Applying Demographic Data to the Distribution of Funds

Since two unique factors have been designated by the Amendments as the most important in deciding how federal vocational education funds are to be distributed to local education agencies along with a provision for including additional discretionary factors, the use of a weighted index is possible for this task. In this case, the two most important factors can be assigned higher index values than those given to discretionary factors.

If discretionary factors are indexed on a five-point scale, concentration of low-income families (in the case of local education agencies) or concentration of "excess cost" students (in the case of other eligible recipients) may be assigned values on a ten-point scale. The combination of two five-point indices to form a single ten-point "ability to pay" index can be used here; e.g., assessed valuation divided by total enrollment = 4, tax rate = 3, total index = 7. Following the procedure outlined earlier, the values of all indices are added together to form a total index for each eligible recipient. Recipients can then be rank ordered according to greatest need. Since the combined index may be large if a number of factors are included, it may be desirable to further subdivide recipients into groups based on their index values, e.g., local applicants with indices ranging from 35 to 40 = group one . . . . The "weights" referred to here are arbitrary judgments of relative importance. They are not the same kind of weights as the empirically determined coefficients in linear regression and related techniques. Strictly speaking, ordinal data cannot be meaningfully added and subtracted. In this case, however, we are using the indices as an approximation to an underlying interval scale, and treating the data as if it were at an interval level of measurement.

One additional problem remains in implementing the funding formula. Since schools with large budgets may appear in either group one or group five and the total amount of funds to be distributed is predetermined, it may be necessary to mathematically determine all feasible distributions which give priority in descending order. For example, suppose it happens that all the schools in group one, the highest priority group, have very large budgets, while those in group five have very small budgets. Funding group one at 75 percent may completely exhaust available funds. Were the situation reversed with small budget schools in group one at 75 percent and scaling steadily down to 15 percent for group five may not completely distribute all available funds. Certainly this is a problem for the computer. A group budget can be calculated from the applicable school budgets and a mathematical algorithm can be applied to determine all possible distributions. The planner choses the distribution with the most even spread.

Other Uses of Demographic Data in the Law

The Amendments specify the use of specific demographic data for targeting certain types of programs. Programs for "displaced homemakers" are to be offered to:

- persons who had solely been homemakers but who now, because of dissolution of marriage, must seek employment

- persons who are single heads of households and who lack adequate job skills

- persons who are currently homemakers and part-time workers but who wish to secure a full-time job

- women who are now in jobs which have been traditionally considered jobs for females and who seek employment in job areas which have not been traditionally considered for females, and men who are now in jobs which have been traditionally considered jobs for males and who wish to seek employment in job areas which have not been traditionally considered job areas for males

Divorce statistics are, of course, readily available. It is more difficult to determine how many of these divorces result in a displaced homemaker. Data on single heads of households is available in the Census: however, it is impossible to determine from this source how many lack adequate job skills.

Priority for work study programs is to be given to local education agencies "serving communities having substantial numbers of youths who have dropped out of school or who are unemployed." Priority for funding cooperative programs is also to be based on high dropout rates and high youth unemployment rates.

Exemplary programs are to be designed for:

- urban centers with high concentrations of economically, disadvantaged individuals, unskilled workers, and unemployed individuals
- persons in sparsely populated rural areas and for individuals migrating from farms to urban areas
- for persons with limited English-speaking ability
- for youth who have academic, socio-economic, or other handicaps

Census publications include mobility data by rural residence, but not necessarily rural to urban migration; they also include data on native tongue, but not necessarily limited English-speaking ability.

Finally, vocational guidance and counseling is to be directed to (among others) youth offenders and adults in correctional institutions, persons with limited English-speaking ability, handicapped individuals, individuals from economically depressed areas, and early retirees. The incidence and location of these groups will need to be obtained from a variety of state and local sources, including state correctional agencies, state employment security agencies, state bureaus of vocational rehabilitation, and private agencies serving the multi-lingual, and handicapped.

Identifying Planning Regions Based on Demographic Factors

Unless a state is unusually homogeneous, it will be beneficial to divide the state into "planning regions" based on available appropriate demographic and labor market data. Much of the data readily available by county are limited, if not nonexistent, at the school district level. If a number of adjacent counties have similar characteristics, it is a simple matter to aggregate data by region (and finally to state) for planning purposes. Factors which should be considered in establishing planning regions include labor market data (such as commuting patterns), population factors (such as urban versus rural), industrial factors (such as farming versus mining), and other factors such as accessibility to public transportation and industrial development. Many states publish statistical abstracts which provide descriptive data including most of these factors mentioned above. Major state universities and state industrial development agencies are two of the most likely publishers.

Priority Decisions Based on Student Accessibility Factors

The law clearly mandates equal access to vocational programs regardless of sex, handicapping conditions, or geographical location. An initial step to planning for equal access is determining current access to all kinds of students. Some applicable questions are: Are vocational programs evenly distributed across the state? What characterizes regions which show a greater need for vocational training? Is vocational participation dominated by large enrollments in a few program areas? What is the relationship between enrollments in area vocational centers and comprehensive high schools?

The percent of students currently served can be computed by dividing vocational enrollment by school enrollment. If a local school sends students to an area vocational center, those students should be included in the vocational enrollment of the local school. It may be desirable to compute separate percentages for grades 9 through 12 and grades 11 through 12.

School data may be aggregated to compute county and regional percentages which can be plotted on color-coded maps or on bar graphs for ease of analysis and communication. Counties or regions in which the percent of students served is low are prime target areas for expanded offerings. In addition, current vocational education services to students in local education agencies need to be considered before approving a local application for a new vocational education program. If current service is high, say 75 to 80 percent, it is unlikely that a potential student body for the new program exists. This suggests that, if implemented, the new program will be hard to fill or will be filled only at the expense of already existing programs.

If enrollment in one or two program areas dominates enrollment in all programs, it is probably appropriate to consider percent of students served with and without enrollments in the dominating programs. By comparing the two calculations, the planner can isolate any biases imposed by an uneven distribution of these programs alone.

The same data may be used to analyze enrollments in area vocational centers. In this case, all the feeder schools in an area center's service area are aggregated and the combined number of students currently served is divided by combined school enrollment to calculate the percent of students in the service area currently receiving vocational training in either the home high school or in the area center. A second percentage representing the area center's "share" in vocational education services provided is calculated by dividing feeder enrollment by combined school enrollment. Area centers with low service percentages are targeted for secondary expansion, while centers with high service percentages can be encouraged to expand adult offerings.

A similar measure for post-secondary and adult populations is needed; however, it is difficult to determine the appropriate common denominator for computing the percent served. Once the target population is identified, the method described above can be used. Unfortunately, more research will be necessary to define realistic target populations for community and junior colleges, long-term adult training programs, and short-term adult programs.

An enrollment analysis by sex is also useful in planning programs to eliminate sex bias and sex-role stereotyping. This analysis, like the others, is best begun at the school/program level and summarized by county, region, and state. Once a benchmark year is established, a trend analysis can be made to determine areas of improvement and to identify areas in which little progress is being made. Statistical tests could be applied to assist in isolating factors which prohibit change in enrollment distribution by sex from factors which promote change. For instance, change in enrollments by sex may be slower in rural schools than in urban schools, change may be more pronounced in area centers than in comprehensive high schools, change may be more rapid in some program areas than in others, or differences may be observed between secondary, post-secondary, and adult programs. Armed with this information, persons charged with responsibilities to plan for the elimination or reduction of sex bias in vocational education enrollments could begin to identify both barriers and facilitators by examining differences between "changers" and "nonchangers." It will, of course, be necessary to indicate by program area, the preferred direction for change.

Data on disadvantaged and handicapped enrollment are necessary for targeting programs to meet the special needs of these populations. Disadvantaged students may be geographically concentrated in economically depressed areas, implying that funds be targeted to these areas for support services to assist students enrolled in regular programs of instruction. Disadvantaged or handicapped students may be programmatically concentrated, suggesting additional efforts to ensure open access to all programs and service in the least restrictive environment.

Summary and Conclusion

The uses of demographic information in planning vocational education are limited by the planner's imagination and by the availability of data to produce the needed information. In deciding which, when, and how demographic information should be used, the planner has several choices to make. In the case of federal requirements relating to approval of applications and funding them, the planner's choices are effectively reduced to one: how the prescribed information can be used to determine the relative need for vocational education. In the case of discretionary information, the planner must consider all the social, economic, and demographic factors that affect relative vocational needs, identify appropriate information elements and then decide which elements to gather and use based on the applicability, strengths, and weaknesses of the data and their source(s), and data acquisition and processing costs. Proficiency in the use of demographic information is a basic prerequisite to planning to meet the dual goals of vocational education:

- meeting employers needs for trained workers
- preparing persons with the job skills they require to enter and advance in the labor market

Vocational planners have made significant progress in using employment demand data to assure that the vocational education which is offered is that which society values most; now we must begin to more effectively match the needs of various populations for job skills with the needs of employers for trained workers to maximize returns for every dollar spent.

CHAPTER III

APPLYING DATA ANALYSIS TECHNIQUES

Detailed techniques are often needed to fully understand the information contained in data collected to facilitate planning. This task is the domain of data analysis or statistics. The term data analysis is often used to refer to the mechanics of manipulating data, while the term statistics is usually used to refer to the more general process of studying data, including both the mechanics and interpretation of the results. The popular definition of statistics sometimes equates it with tables of data. For example, a table depicting the United States dollar expenditure on vocational education in each year from 1960 to present would be considered "statistics" from the popular viewpoint, but is just data from our perspective. This chapter is concerned with statistics in the generic sense of using mathematics to elicit information and meaning from data.

The use of complex statistical methods is often necessary because the world is, in fact, a complex one. So much data are available that some means of condensing and digesting them are necessary in order to make them intelligible. The reader should be aware, however, of an important restriction on the use of any data analysis technique: its utility is limited by the particular data which are being analyzed. Throughout this chapter, we will be discussing the measurement of variables which are chosen for analysis because it seems likely that they have an important effect. However, there are always a great many variables which are <u>not</u> chosen, but which may nonetheless have an important effect. The results of any data analysis are therefore only an approximation. Their usefulness depends upon how closely the data analysis model approximates the real world.

Many of the techniques described, especially the more sophisticated ones, require the availability of a large variety of data. Planners may question whether it is feasible to keep large quantities of data on hand. If the data had to be kept on paper and retrieved by hand, the answer may be no. However, with the present state-of-the-art of computerized management information systems, large volumes of data can be stored and easily retrieved. Through the use of data base management systems, the data can be retrieved in almost any combination desired and used as input to the techniques described in this chapter, or others.

Organization of This Chapter

The remainder of this chapter is divided into four sections: General Concepts, Basic Statistical Measures, Data Analysis Methods, and Special Topics. Since the readers of this manual include planning practitioners with a wide variety of backgrounds in statistics and mathematics, it seemed most appropriate to include material of varying mathematical complexity. A selection of the most useful techniques are presented, ranging from those which require little mathematical background to those which require some knowledge of basic algebra.

No attempt has been made to present a comprehensive treatise on statistics and data analysis. For a more thorough treatment of the data analyses techniques suggested, or for extended analyses which may go beyond our purposes, the interested reader may refer to standard texts on statistics, some of which are listed in the bibliography.

General Concepts

Sample vs. Population

If a planner were interested in obtaining information about a certain domain, such as the enrollment in every program in every school throughout the state, that person would be defining a population. A population is simply the domain about which one wants to obtain information. Sometimes, however, a population is so large, that it is impractical or impossible to collect data on every unit within it. If one wanted to know, for example, the racial composition of every school building in the state of California, it may be very impractical to determine the race of every student in the state. In such cases one solution is to resort to sampling. A sample is a subset of a population, usually small enough to make it practical to collect data about it. Data are collected on the sample only, and the desired characteristics of the population are then inferred from the characteristics of the sample. In order to make such an inference possible, a special kind of sample is needed: a representative sample. A representative sample is one whose characteristics of interest are very close to those of the population which it represents.

It should not be assumed that size per se is a distinguishing characteristic between populations and samples. A classroom, for example, would be a sample if it were used to infer characteristics about the school district, but would be a population if the classroom itself were the domain of interest. A classroom teacher might be interested in the average IQ score of her/his class, and that is as far as his/her interest goes. From the teacher's perspective, that classroom is the population.

Real vs. Hypothetical Populations

A real problem is one in which all members exist. Program enrollments in each LEA in the state in 1976 are an example of a real population. It is always theoretically possible to measure every member of a real population, although the population may be so large that it makes this impractical. Real populations always have a finite number of members.

Often, the population in which one has an interest is one in which all of the members do not exist. Suppose a planner were interested in determining whether certain programs were more attractive to men than to women. The planner might look at the enrollment figures for this year, or for the past five years, but this would have to be regarded as a sample. The planner is not interested in the students who are enrolled just this year, or just the past five years, since those figures may change from year to year. The planner is really interested in the most abstract construct, "men in general" and "women in general," including those who have been students in the past, those who are students now, and those who will be students in the future. Such a population is called a hypothetical population. Since all of its members do not exist, (some exist now, some have existed in the past, some will exist in the future), it is not possible to measure every member; and its size is always assumed to be infinite. Consequently, its characteristics must always be inferred from sample data.

Descriptive vs. Inferential Statistics

We have already touched on the difference between these two branches of statistics. Descriptive statistics, as its name implies, is that branch which describes the current state of affairs of a domain. If the IQ of every student in a school building is obtained and the average IQ is calculated, we have obtained a fact about all students in the school building. If the IQ of every student in a state were obtained and the average IQ calculated, we would, likewise, have obtained a fact about all students in the state. Suppose, however, we obtain IQ scores from a representative sample of 5 percent of the students in a state, calculate the average IQ of the sample, and make an estimation from this of the average IQ of the whole state. We do not have a fact about the state, only an inference with some specified degree of accuracy. This is the field of inferential statistics. A statistical inference is never considered to be totally accurate; it is usually stated as being accurate within some specified degree of tolerance. Although descriptive statistics are normally applied only to populations, they are sometimes applied to samples under conditions where it can be assumed that the "match" between the sample and the population is so close that to resort to inferential statistics is not necessary, or when only a rough approximation of the population characteristics is needed.

Levels of Measurement

Data which are obtained and analyzed as part of the planning process are usually expressed as some sort of numerical measurements. These measurements are one of four types, referred to as levels of measurement, depending on the mathematical properties of the scores. This concept is important, because many of the data analysis techniques to be described depend upon the data being at some minimum level of measurement.

Nominal level. At this level, data (scores for example) are used for identification purposes only. An example would be the assignment of a score of 1 to a student if the student were male and a score of 2 if the student were female. Such scores can be counted and percentages calculated, but no arithmetic functions (addition, subtraction, multiplication, or division) can meaningfully be done to them. It would be meaningless, for example, to add such scores, calculate an average, and say that "the average sex of schools in Region 10 is 1.35."

Ordinal level. Scores at this level have the property of rank order. It can be said that one score is greater than or less than some other score, but not by how much. Rankings are the most common example of this type of score. The program with the highest enrollment might be assigned a score of 1, the program with the next highest enrollment a score of 2, etc. It could then be said the program with the rank of 6 had a greater enrollment than the program with a rank of 7, but it could not be said how much greater.

Interval level. Measurements at this level, in addition to all the properties of the lower levels, have the equal interval property. Distances between scores are meaningful, and they can be added and subtracted, but not multiplied or divided by each other. The Fahrenheit temperature scale is a good example of this level of measurement. The zero point is arbitrary; consequently, it can be said that 80° is 40° warmer than 40°, but is not twice as warm. This is because the zero point does not represent the total absence of heat, a condition that would be necessary in order to form meaningful ratios. Test scores are another example of an interval level of measurement. A score of zero on a test does not normally indicate a total absence of knowledge about the subject matter, but only a level of knowledge somewhere below the floor of the test.

Ratio level. Measurements at this level have a true zero point; that is, a score of zero indicates a complete absence of the thing being measured. Both distances and ratios are meaningful, and all four mathematical operations can be performed. Program enrollments are an example of this level, since an enrollment of zero means exactly that: no one at all is enrolled in the program.

Basic Statistical Measures

Certain statistical measures are so commonly used in many data analysis methods that a description of them is in order at this point. These measures are the three sets of summary statistics that can be used to describe distributions of numbers.

Any distribution can be summarized in terms of three characteristics: its shape, central tendency, and dispersion. The first is usually expressed in qualitative terms, while the latter two are usually quantified.

Consider the distribution of "dollars spent per student" for a particular program for each LEA in the state. Such a distribution might be graphed as shown in Figure 3.

The horizontal axis represents the number of dollars spent per student. Consider each point on the axis to represent a range of dollars; that is, the $10 point represents the range $5-$15, the $20 point represents the range $15-$25, etc. The numbers along the vertical axis represent numbers of school districts. Thus, approximately 50 districts spent $5-$15 per student, 200 districts spent $35-$45 dollars per student, 150 districts spent $65-$75 per student, etc.

The shape of any distribution of numbers is simply a verbal description of what it looks like. The distribution in Figure 3 is bell-shaped, and is one of the most common, probably the most common, shape of naturally occurring phenomena. Bell-shaped distributions which are relatively peaked are called leptokurtic, while those which are relatively flat are called platykurtic (Figures 4 and 5). Other shapes are J-shaped and S-shaped (Figures 6 and 7). Distributions with two peaks are called bimodal (Figures 8 and 9). Because of the common occurrence of bell-shaped distributions, no further consideration will be given to other shapes.

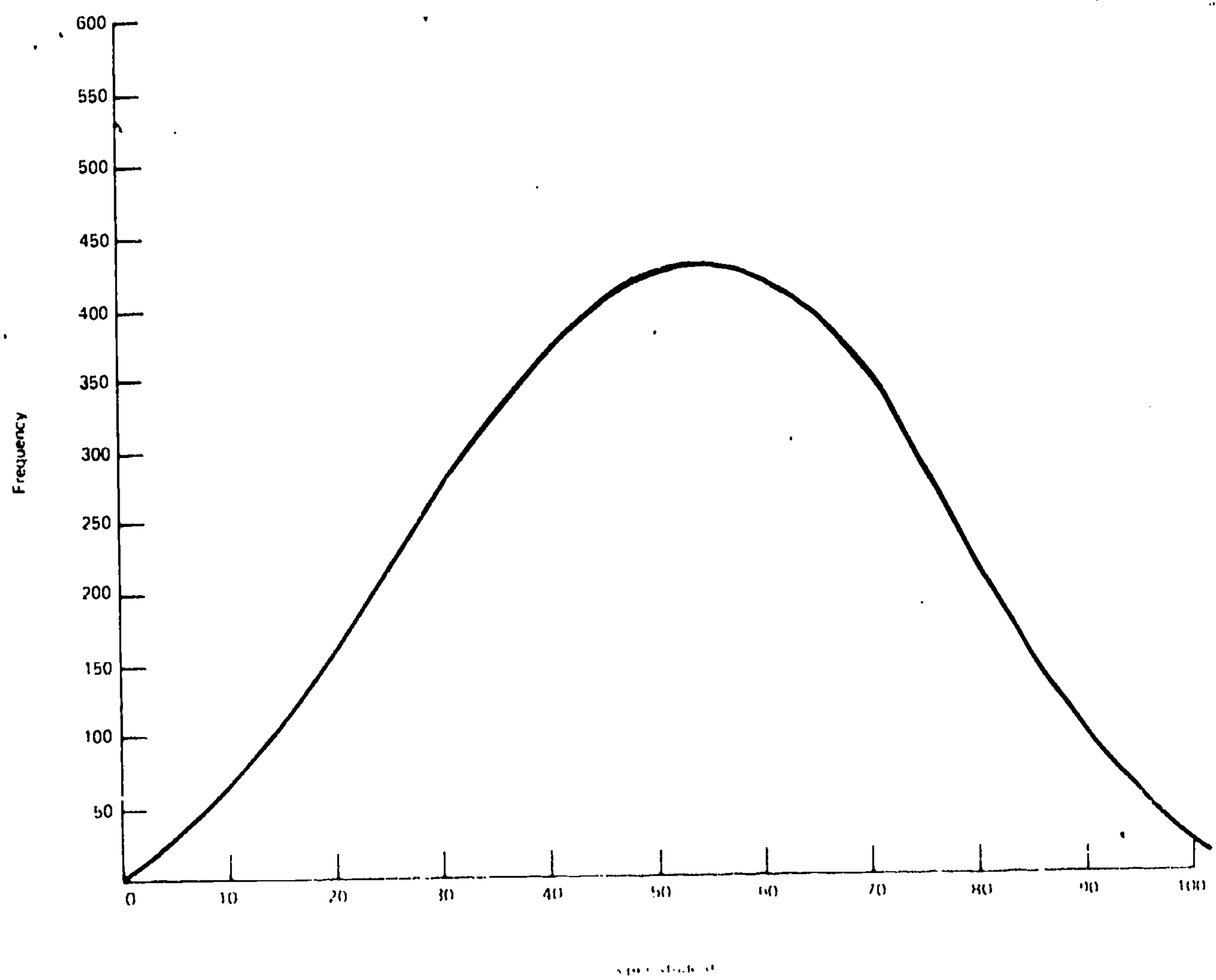
Frequency
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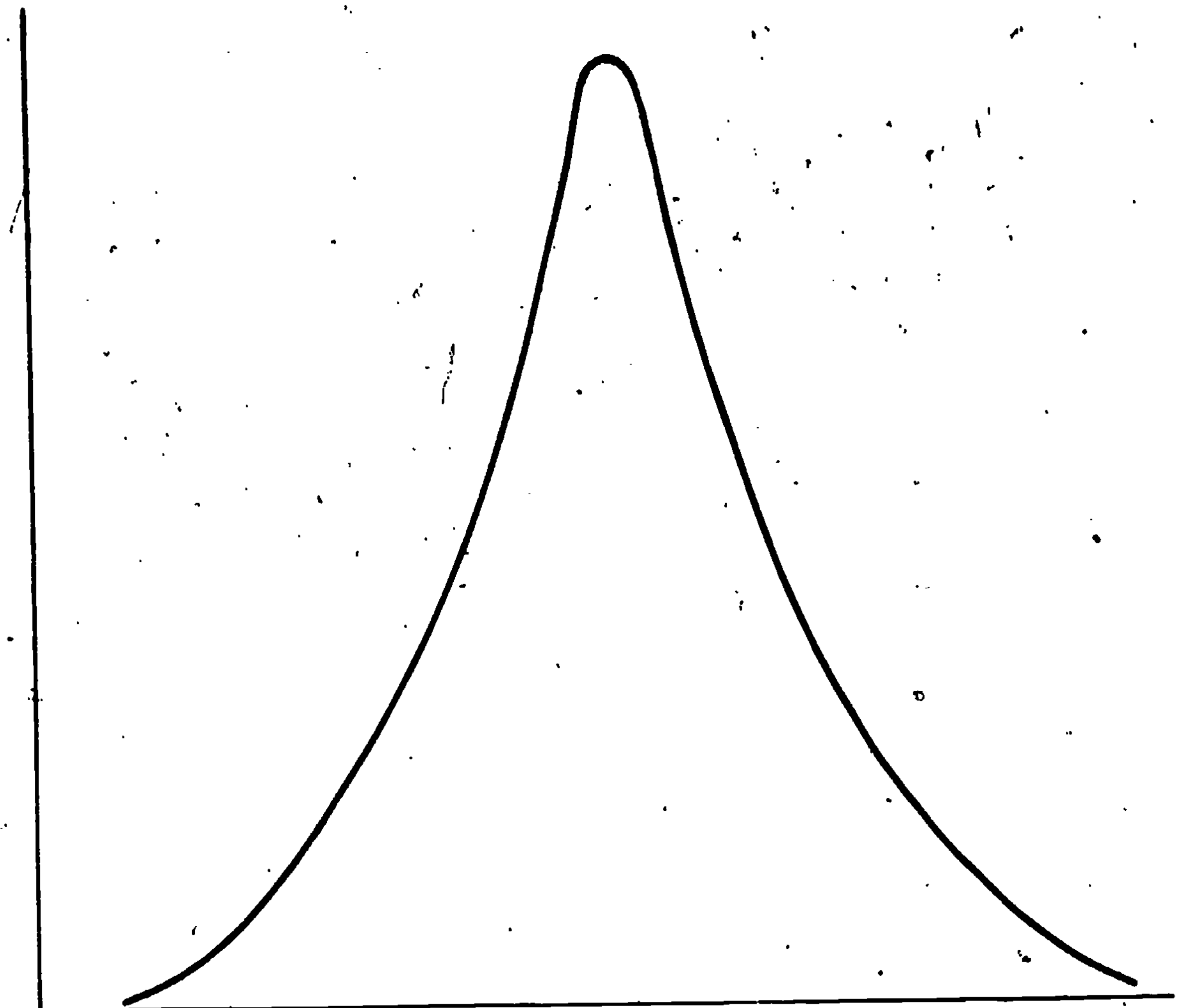
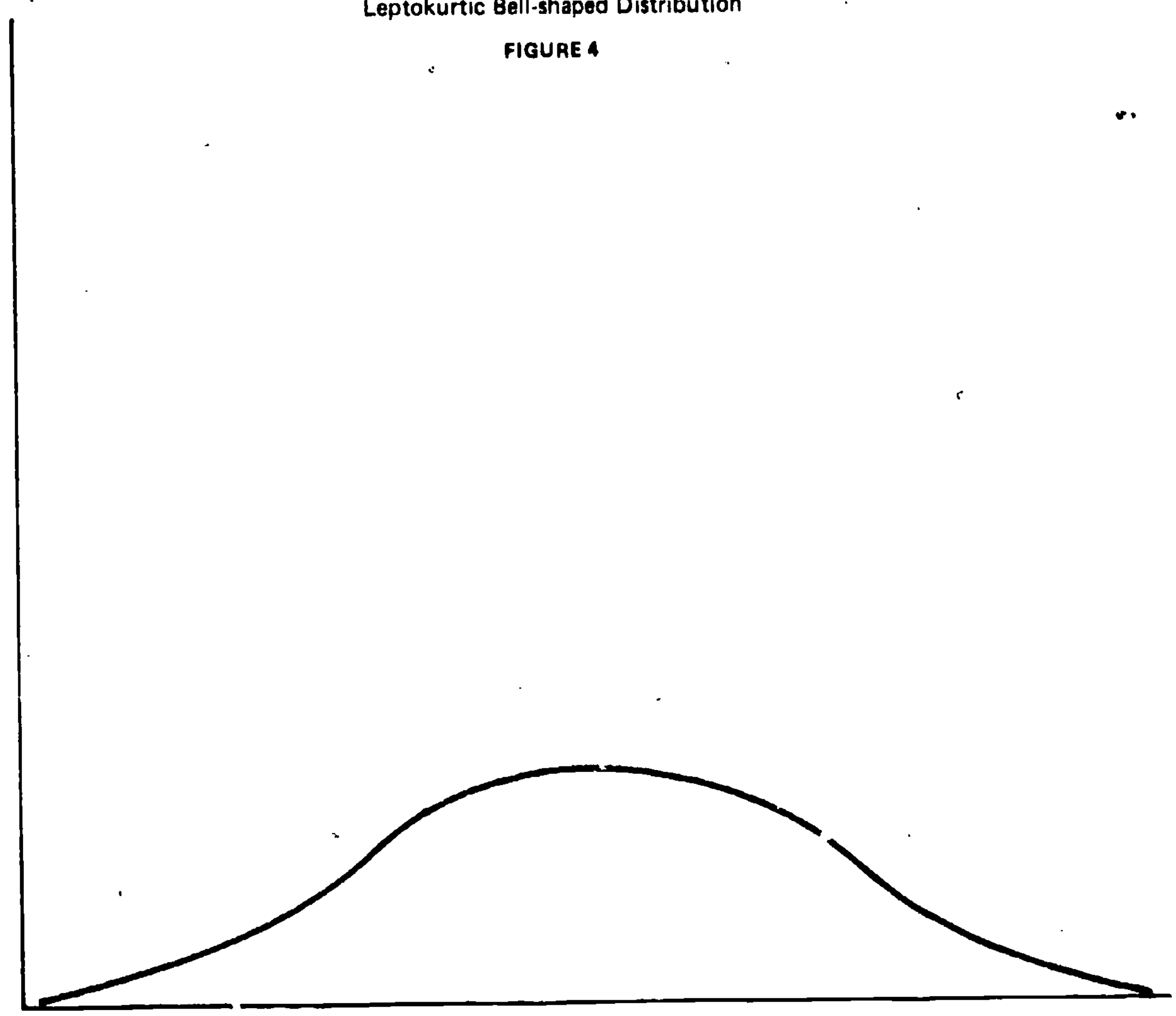
FIGURE 3



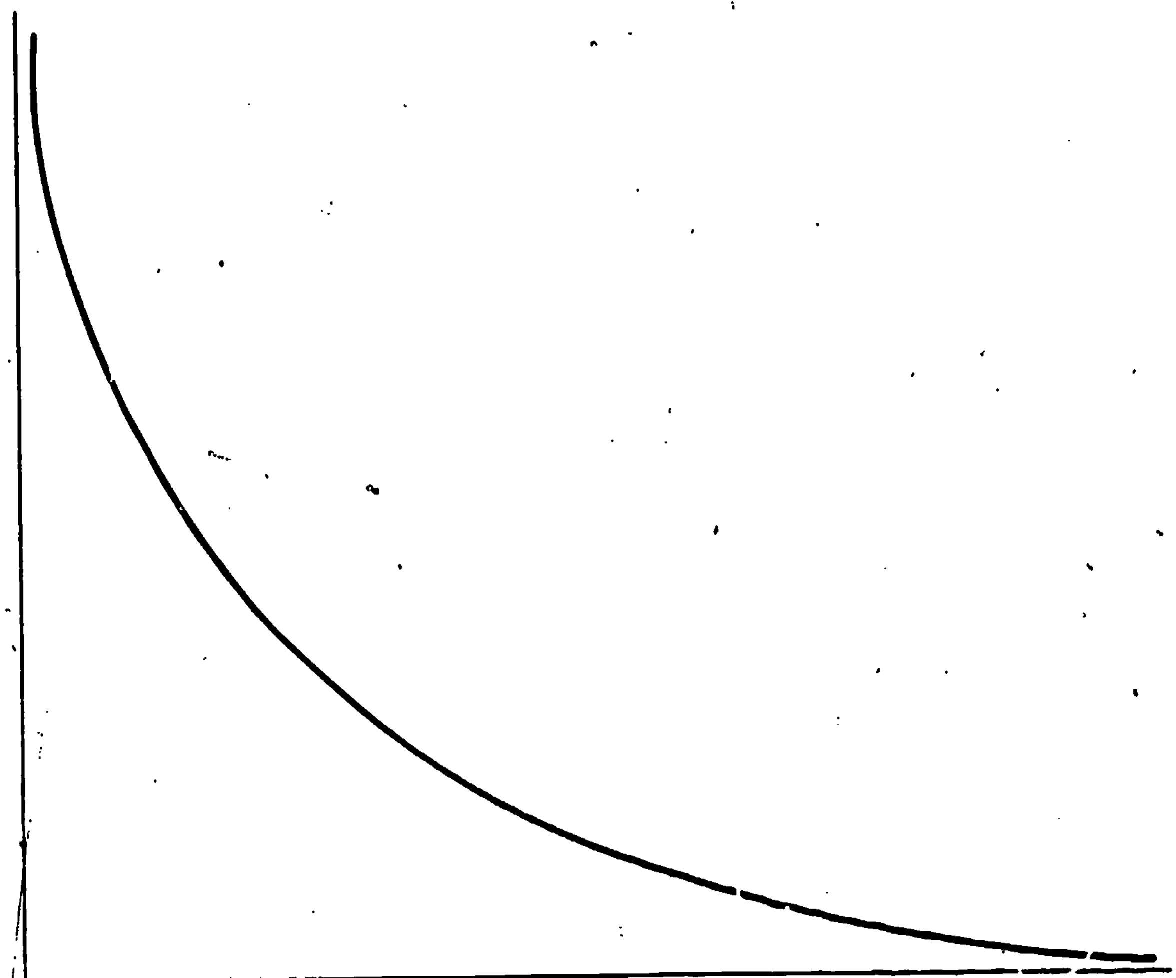
Leptokurtic Bell-shaped Distribution

FIGURE 4



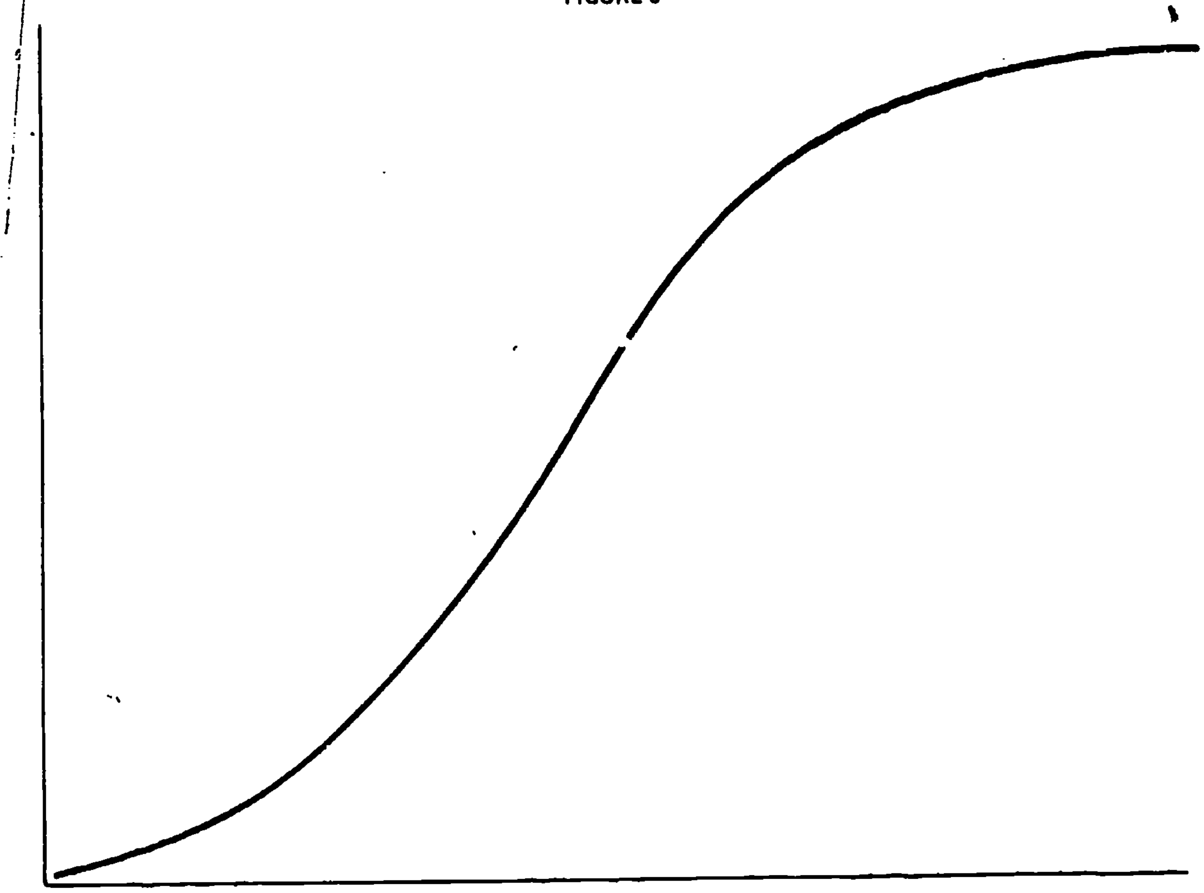
Platykurtic Bell-shaped Distribution

FIGURE 5



J-shaped Distribution

FIGURE 6



S-shaped Distribution

FIGURE 7

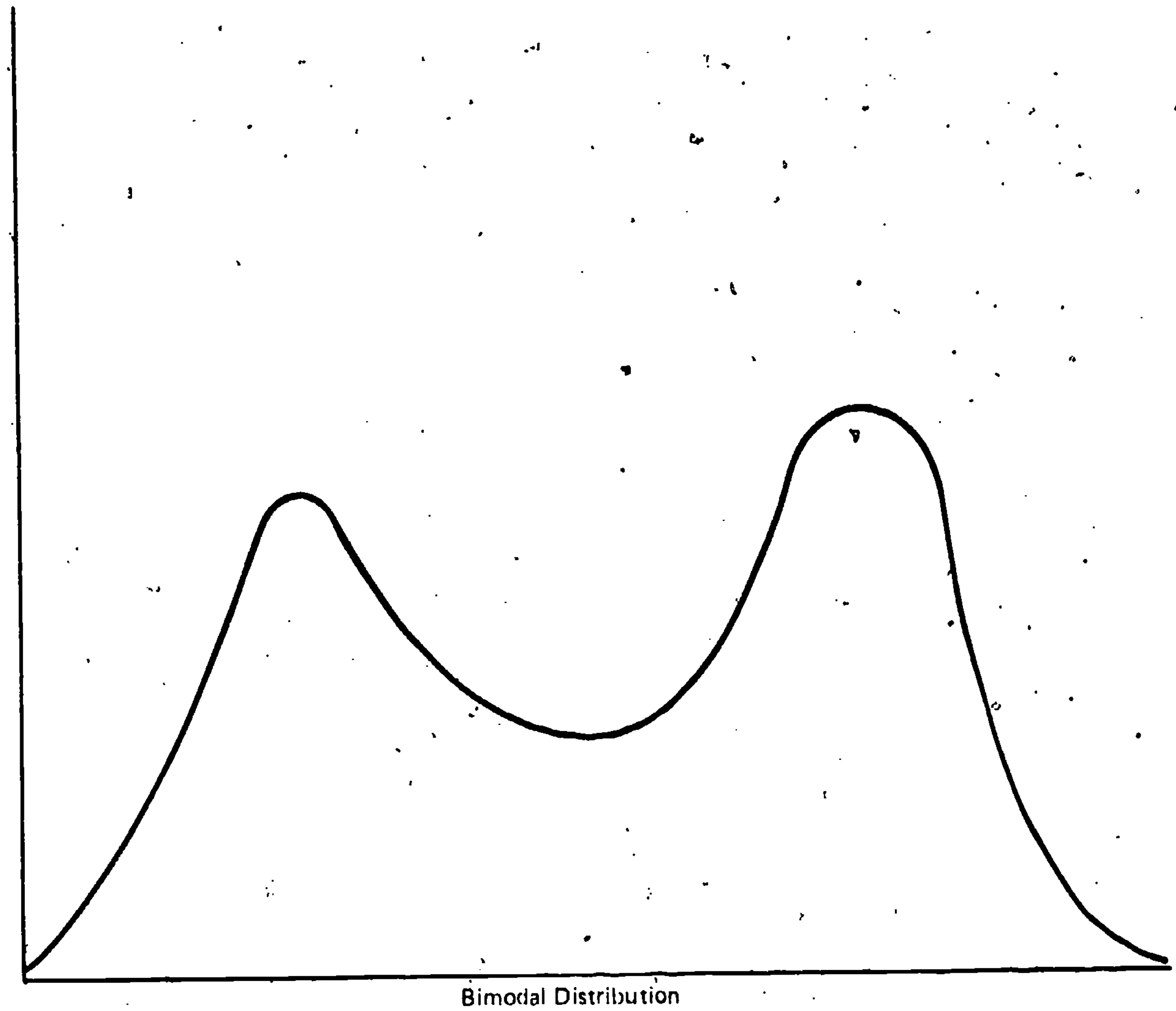


FIGURE 8

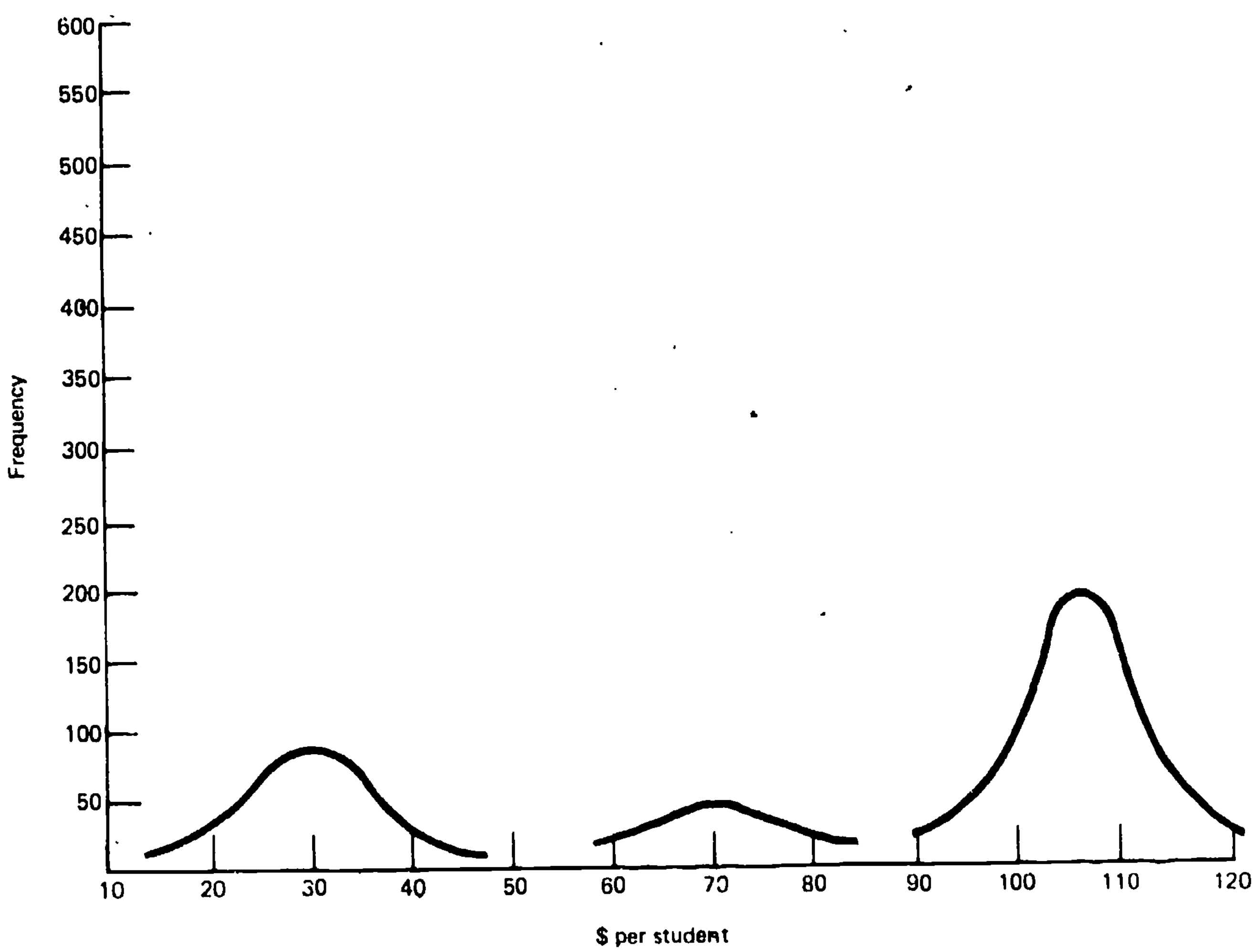


FIGURE 9

The central tendency of a distribution, sometimes called its location, describes where it is along a continuum. Consider the distributions shown in Figure 9. Notice that all three have the same shape. The third is larger than the others, but its proportions are the same. They differ, however, in where they are located along the continuum. The first centers around $30, the second around $70, and the third around $110.

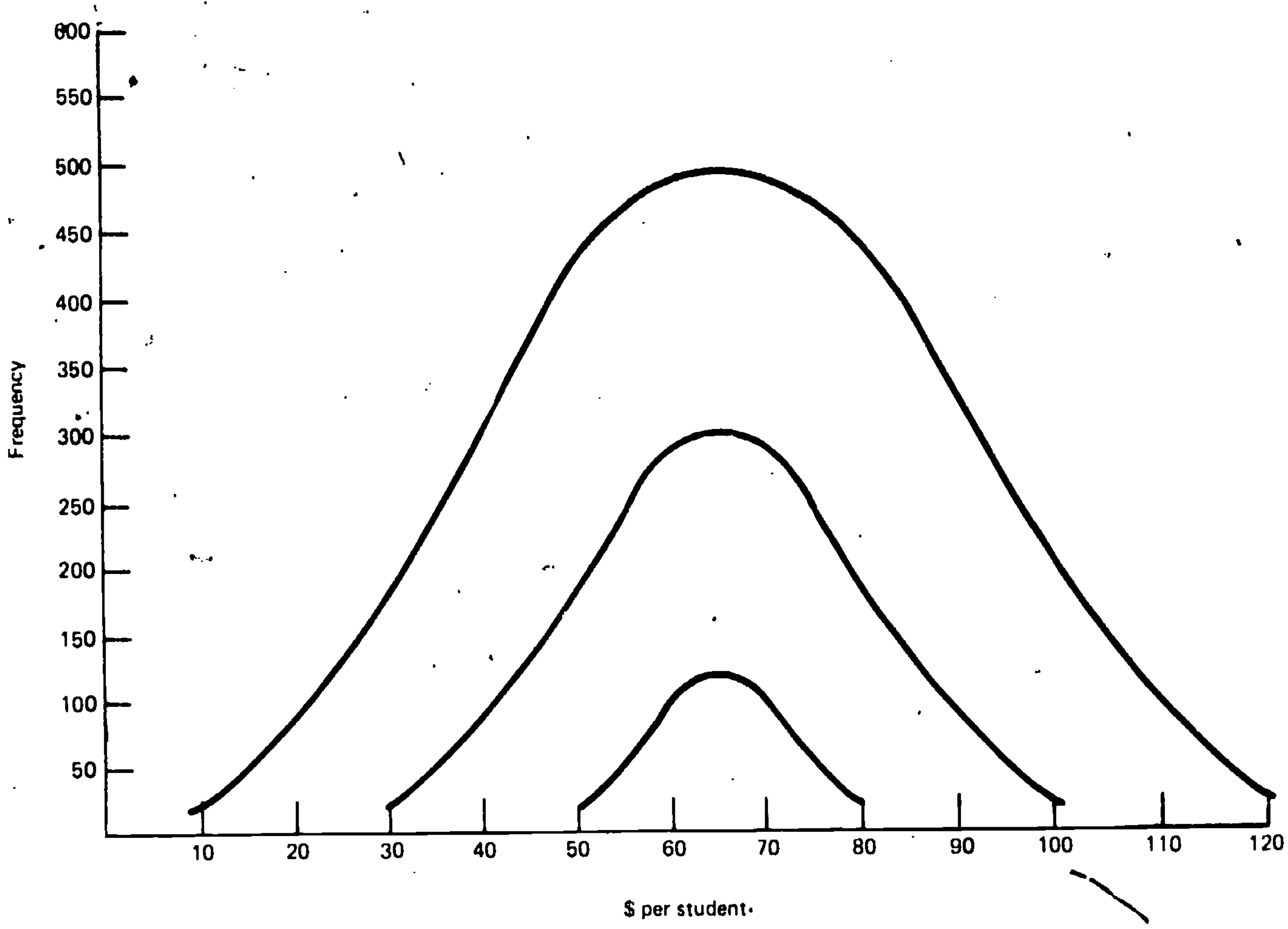
The three most commonly used measures of central tendency are the mean, median, and mode. The mean requires at least an interval level of measurement and has the advantage that it is sensitive to all of the scores in the distribution. Its formula is $\bar{x} = \frac{\Sigma x}{N}$, which says that the mean is calculated by adding the individual scores and dividing by the total number of scores.

The median is a less sensitive measure of central tendency, but can be used with ordinal level data. It is defined as the score above which 50 percent of the scores fall, and below which 50 percent of the scores fall. In other words, it is the middle-most score in the distribution.

The crudest measure of central tendency, but the only one which can be used with nominal level data, is the mode. The mode is simply the score which occurs most frequently. It is interesting to note that, for symmetric, bell-shaped distribution, the three measures are identical.

The dispersion of distribution is a measure of how spread out the scores are spread around their central tendency. Consider the distribution shown in Figure 10. Notice that all three distributions have the same shape and the same central tendency. The inner-most one, however, is "bunched up" around its central tendency, ranging from 60 to 80. The middle distribution is more spread out, ranging from 40 to 100, while the outer distribution is still more spread out, ranging from 10 to 120.

Two closely related measures, the variance and the standard deviation, are the most common measures of dispersion. Like the mean, both require an interval level of measurement and are sensitive to all the scores in the distribution. The formula for the variance is determined by $\sigma^2 = \frac{\Sigma(x-\bar{x})^2}{N}$ which says that the variance is calculated by subtracting the mean of the distribution from each score, squaring the differences, summing the squared differences, and dividing this sum by the total number of scores. The standard deviation is the square root of the variance. Neither has any advantage or disadvantage over the other. Their statistical properties are somewhat different, and they are used in different inferential techniques. For descriptive purposes, the standard deviation is nearly always used.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Frequency
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50
60
70
80
90
100
110
120
$ per student

FIGURE 10

For data at the ordinal level of measurement, either the range or the semi-interquartile range is used. The range is the highest score minus the lowest score. This measure is subject to distortion by extreme scores; therefore, the semi-interquartile range is more commonly used. It is the score at the 75th percentile minus the score at the 25th percentile. The 75th percentile is the score below which 75 percent of the scores fall; the 25th percentile is the score below which 25 percent of the scores fall.

Data Analysis Methods

Data analysis methods as they apply to the planning process can be divided into five groups, ranging from least to most complex:

- simple enumeration
- multiple enumeration
- difference analysis
- relationship analysis
- trend/projection analysis

For each category, some of the most commonly used techniques are described and their use illustrated by an example from a planning situation. Detailed instructions on how to use the techniques are, however, beyond the scope of this manual. The interested reader is referred to several standard textbooks listed in the bibliography.

Simple Enumeration

Purpose. The purpose of simple enumeration is to determine the quantity or amount in which some variable occurs. The nominal level of measurement or higher is required.

Description. Simple enumeration involves nothing more than counting the quantity or measuring the amount of some variable. The most common example in planning is enrollment counts. As simple as it is, it may nevertheless be useful in some situations.

Illustration. For purposes of ongoing program monitoring the state of New Monmouth needs to determine which of its programs are most popular on a statewide basis. A simple list of the total enrollment count in each program will snow this.

Multiple Enumeration

Purpose. The purpose of multiple enumeration is to determine the quantity or amount in which some variable occurs within specified classifications. The nominal level of measurement or higher is required.

Description. Like simple enumeration, this technique is also based on counting quantities or measuring amounts. The counts or amounts, however, are obtained for specified cross-classifications (cross-tabulations) based on two or more classification variables. A two-way cross-tabulation is illustrated in Figure 11.

A cross-tabulation table may contain percentages or proportions, as well as counts. Figure 12 illustrates a three-way cross-tabulation with the enrollment counts shown as proportions by ethnic group. The two tables should be viewed as two "slices" of a cube, as shown in Figure 13.

Illustration. For purposes of program evaluation, the state needs to know whether the mix of students, by sex and ethnic group, in each county is reflective of the mix in the population. A set of tables similar to those in the above example is generated for each county. The proportion of students in each ethnic group can be compared to the known proportions in the population, available from demographic data. Where large discrepancies occur, studies can be undertaken to determine the cause of such discrepancies and what, if any, action should be taken to change the mix of students.

Analysis of Differences

Purpose. The purpose of analysis of differences is to determine discrepancies between groups or between members of the same group.

Dispersion analysis. Dispersion analysis is a technique for locating extreme members of a distribution. Members that are very far removed from the central tendency of a distribution may be experiencing some kind of problem that needs to be addressed. The determination of how far away from the central tendency of a distribution a member needs to be in order to be considered "extreme" is the function of dispersion analysis. Suppose that, in the state of West Minster, with 300 LEAs, the mean cost per student for the Agricultural Production program is $50. However, the Washington school district spends $20 per student, the lowest in the state, while the Jackson district spends $80 per student, the highest in the state. Are these figures extreme?

Enrollment by Program and Sex

Program Name	Male	Female
Agriculture	6149	5278
Health	486	26
Distributive Educa.	1030	3065
	⋮	⋮
Other	2147	948

FIGURE 11

Enrollment by Program, Sex, and Ethnic Group

Male

	White	Black	Spanish Surname	Asiatic	Amer. Indian	Total	
Agricul-ture	1000 .25	1200 .30	800 .20	400 .10	600 .15	4000 1.00	Number Prop.
Health							
Distributive Education							
Other							

Female

	White	Black	Spanish Surname	Asiatic	Amer. Indian	Total	
Agricul-ture							Number Prop.
Health							
Distributive Education							
Other							

FIGURE 12

Enrollment by Program, Sex, and Ethnic Group

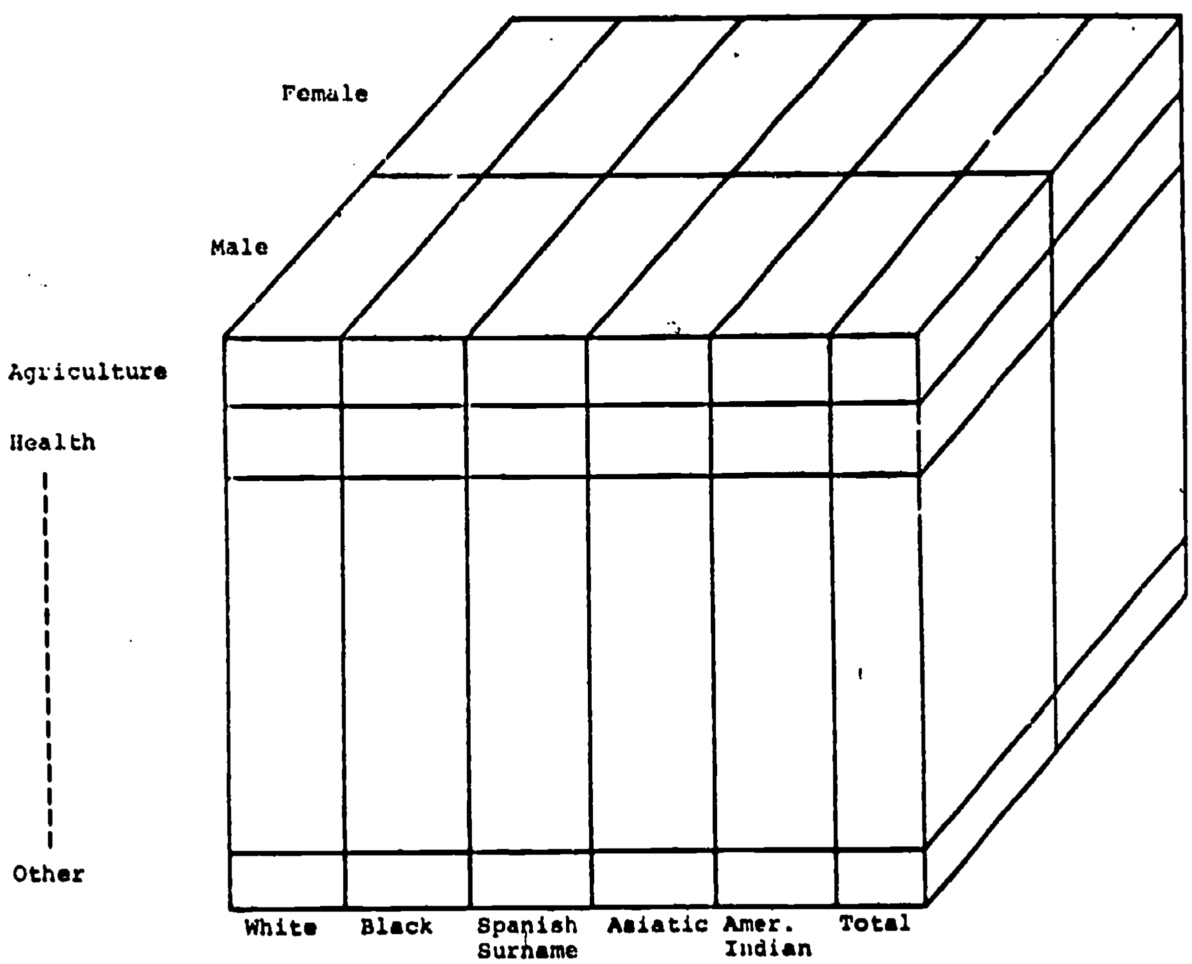


FIGURE 13

At this point, we cannot say. We do not know how atypical these values are because we do not know how the other school districts are distributed. If the distribution is more-or-less bell-shaped, and if the costs are pretty well spread throughout the range, the highest and lowest figures do not appear to be out-of-line. There would be several districts spending $22 or $78, several more spending $24 or $76, still more spending $26 or $74, etc. Suppose, however, that nearly all the districts except the two extremes were much closer to the mean; for example the second lowest cost was $45 and the second highest was $55, with all others falling between $45 and $55. It can now be seen that, relative to the cost/student in other districts, Washington and Jackson are far out of line, which may indicate the presence of some problem that needs to be addressed. While these two extreme examples are obvious, most such distributions would not be obvious. A method is needed for determining quantitatively whether an "outlier" is sufficiently far removed from the central tendency to warrant further investigation.

The procedure for doing this is straight-forward and relies on a measure of dispersion, (the standard deviation) and a theoretical bell-shaped distribution called the <u>normal distribution</u> or <u>normal curve</u>. It requires at least the interval level of measurement. It can be demonstrated mathematically that a great many naturally occurring phenomena are normally distributed in an infinite, hypothetical population, even though they may not be in any real population. One of the characteristics of the normal distribution is that fixed proportions of the cases always fall at or beyond fixed distances from the mean. For example, in a normal distribution, 2.5 percent of the cases always fall at or above 1.96 standard deviations above the mean. Likewise, 2.5 percent of the cases always fall at or below 1.96 standard deviations below the mean. If a real distribution approximates a normal distribution, we can use this property to determine whether any given case is more extreme than some specified percent of all the cases in the hypothetical population. Only three steps are involved:

1. Select a cut-off percent. This is an arbitrary choice, and depends on how conservative the planner wishes to be. One percent would seem reasonable, though. If a cost per student is in the top or bottom 1 percent of the distribution in the hypothetical population, it is quite far out relative to the rest of the cases.

2. Calculate the standard deviation of the observed distribution according to the formula $\sigma = \sqrt{\frac{\Sigma (x-\bar{x})^2}{N-1}}$

   This is the same as the formula previously given on page 34 for the variance and standard deviation, except that we are dividing by N-1 instead of N. This will be an estimate of the standard deviation in the population.

3. From each cost per student in the distribution, subtract the mean cost per student; divide this by the standard deviation.

We now have the number of standard deviations away from the mean from which each cost per student lies. Look in a normal curve table to determine the cut-off point for the selected percent. In this case the cut-off point is 2.57. Any cost per student which is at least 2.57 standard deviations away from the mean should be considered "out-of-line" and investigated for possible corrective action.

Analysis of variance. This is a technique for determining whether two or more groups on which some measurements have been taken have different means. At least the interval level of measurement is required. The state of Franklin has adopted a "compensatory funding" program whereby planning regions which have been historically underfunded relative to other regions are entitled to additional funding. Obviously, the place to start is to calculate the mean funding level of each of the state's six planning regions of approximately equal population, over some number of years in the past, the past 10 years, for example. The means would first have to be adjusted for changes in the Consumer Price Index, or other index of inflation, in order that all values be in constant dollars. If the six means are calculated, in all likelihood they are not going to be exactly identical. We are faced with the problem, then, of determining how big a difference is needed to establish an "underfunding trend," since small differences can be dismissed as resulting from random year-to-year fluctuations. Such random fluctuations could result from price changes, need for equipment one year but not another, etc. One solution to this problem is to examine the dispersion between the region means relative to the average dispersion of funding levels within regions. If the between-regions dispersion is about the same size as the average within-regions dispersion, (after certain statistical adjustments are made), the observed differences between the region means can be dismissed as a random phenomenon; but if the between-region dispersion is considerably greater than the average within-regions dispersion, we would have to accept that those differences are real, and are not attributable to random fluctuations. Analysis of variance is the technique for accomplishing this. The steps involved, simplified for the sake of clarity, are:

1. Calculate the mean funding level of each region.

2. Calculate the variance of the year-to-year funding levels within each region.

3. Calculate the average within-regions variance by adding the variances for each region and dividing the sum by the number of regions.

4. Calculate the variance among the region means.

5. Obtain the ratio of the between-regions variance to the within-regions variance (the F-ratio).

6. Select a probability figure (level of confidence) that states how much risk you are willing to take of being wrong if you should conclude that the differences are real. Five percent is commonly used.

7. Look up the F-ratio in an F-table in a statistics text to determine the minimum value needed for the selected level of confidence. For the 5 percent level of confidence, with six regions and ten measures per region, the minimum value is 3.22. If the calculated F-ratio is at least this large, it can be concluded, with only a 5 percent risk of being wrong, that the mean funding levels are really different. If the F-ratio is less than this amount, it is safer to conclude the differences in mean funding level are random and grant no compensatory funding.

Chi-square. This is a technique for comparing two distributions to determine whether they should be considered identical or not. A good example will be found on page , Chapter II, Applying Demographic Information. The question is asked "How does the sex, race, and age distribution of the overall population compare with the distribution of enrollment in vocational education by race, sex, and age?" The question concerns whether the proportion of persons in each race category, or each sex category, or each age category for the general geographic area is the same as that for vocational education enrollment in that area. For illustrative purposes we will use race, although the technique would be the same for the other two variables.

We begin by constructing a frequency table showing the number of persons in each race for the general geographic area and enrolled in vocational education (Figure 14). For illustrative purposes, the proportions are shown also, although only the enrollment counts are used in the data analysis calculations.

At first glance, the proportions appear to be different. If we are concerned only with the particular group of people that we have obtained counts on--for example, the counts in one school district at the present time--then there is nothing more to be done. We are concerned with purely descriptive statistics and it is apparent that for this group at this time the proportions are different. More likely, however, this group would be a sample of a hypothetical population, in which case we are faced with the same question that we had in the analysis of variance example: are these differences real in the population, or are the observed differences merely random fluctuations. We need to know how large the observed differences need to be in order to conclude, with no more than, for example, a 5 percent chance of being wrong, that the differences are real. The logic of this statistical test is similar to that for analysis of variance:

1. A statistic called chi-square is calculated from the observed data.

2. This value is looked up in a chi-square table in a statistics text.

3. If the value obtained is at least as large as the value specified in the table, in this case 15.51, then we can conclude that the differences in proportion are real, with no more than a 5 percent risk of being wrong.

Relationship Analysis

Purpose. The purpose of relationship analysis is to determine the value of one variable relative to that of another, or to determine changes in the values of one or more variables relative to changes in the values of one or more other variables.

Ratio analysis. Ratio analysis requires a ratio level of measurement and is a technique so familiar to planners that little elaboration is necessary. It is simply the ratio of one number to another, usually for purpose of equalizing units of measurement. Dividing the cost of a program by the number of students in the program is a familiar way of determining the cost per student of a program. Enrollment per 10,000 population might be another example of a useful ratio.

Ratios may also be used to make certain kinds of projections. In the following formula, let A = the number of students enrolled in Health Occupations programs this year, B = the program cost this year, C = the expected enrollment next year, and X = the (unknown) program cost next year:

$$\frac{A}{B} = \frac{C}{X}$$

FIGURE 14

	White	Black	Spanish Surname	Asiatic	American Indian
Geographic Area	5000 .720	1000 .150	500 .075	250 .075	250 1.000
Vocational Programs	600 .600	200 .200	100 .100	50 .050	50 .050

ENROLLMENTS AND PROPORTIONS OF PERSONS BY RACE AND LOCATION

Solving this equation for X,

$$AX = BC$$

$$X = \frac{BC}{A}$$

gives the expected cost of the program next year. The solution for the expected cost is obtained by multiplying B times C and dividing the product by A.

Linear regression. Simple linear regression is a technique for quantitatively measuring the extent to which changes in one variable are a function of changes in another. It requires at least the interval level of measurement. Consider the following distributions of the height and weight of six people:

HT.	WT.
5.0	100
5.2	120
5.4	140
5.6	160
5.8	180
6.0	200

It can be seen that, for each increase of .2 feet in height, there is a corresponding increase of 20 pounds in weight. The two variables, height and weight, are said to be correlated. More specifically, the relationship is a perfect positive correlation. It is perfect because there are no exceptions to the relationship and it is positive because the two variables are related in the same direction, (as one increases the other increases). If we change the distributions as follows:

HT.	WT.
5.0	100
5.2	120
5.4	138
5.6	163
5.8	181
6.0	199

The correlation is still positive, though it is no longer perfect. For each .2 increase in height, there is a weight increase of approximately 20 pounds, but it is no longer exact. Such a situation can be referred to as a strong positive correlation. If we weaken the relationship still further:

HT.	WT.
5.0	100
5.2	130
5.4	120
5.6	160
5.8	140
6.0	150

Now we have only a general tendency for weight to increase as a function of height, representing a moderate positive correlation. It should be apparent that if we continue to "scramble" the weight figures relative to the height we will eventually obtain only a slight, or no, correlation.

It is also possible for one variable to decrease as the other increases. If weight went down as height went up, we would have a negative correlation.

The correlation coefficient is a measure of the strength and direction of relationship between two variables. This coefficient is symbolized by the lower case letter r. The steps in calculating a correlation coefficient need not concern us here. Correlation coefficients, rs, range in value from -1.00 to +1.00. The size of r indicates the strength of the relationship. Values of r below .30 are usually considered to indicate that a trivial relationship exists. Values of r between .30 and .49 are usually considered to indicate that a weak relationship exists. An r between .50 and .69 indicates the presence of a moderate relationship, and an r between .70 and .89 the presence of a strong relationship, and an r between .90 and .99 indicates the presence of a very strong relationship. An r of 1.00 represents a perfect relationship.

The state of New Monmouth would like to assure that those programs leading to occupations with the highest projected demand are the ones for which the greatest number of people are enrolling. The correlation coefficient between program enrollment and occupational demand could be calculated. If r is high, there is no problem. If r is low to moderate, perhaps some corrective action needs to be taken to provide incentives for enrolling in programs leading to high-demand occupations. If r is strongly negative, then programs preparing persons for occupations with the greatest opportunities for employment are not being filled by students. The state might then want to determine if students shy away from enrolling because of unwillingness to enter the particular high demand occupations or if there are conditions about the programs which are related to lack of enrollments e.g., problems if image, accessibility.

Trend Analysis

Purpose. The purpose of trend analysis is to establish the existence of trends for the purpose of projecting the trend into the future and for making forecasts.

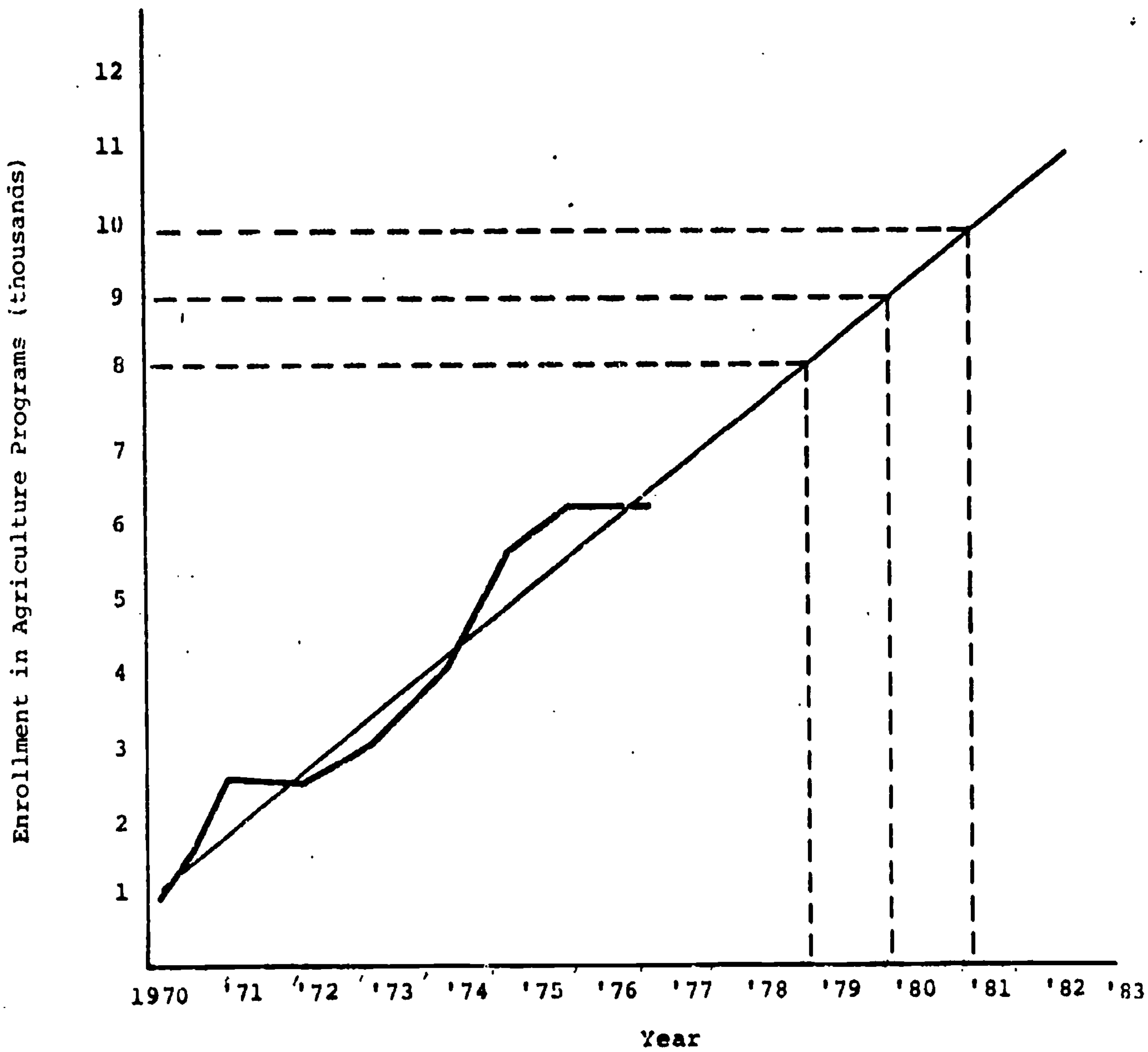
Straight-line projection. This is a relatively simple method, requiring at least an interval level of measurement based on the assumption that a trend that has been going on for some time will continue into the future. It is usually done graphically by plotting a variable on the vertical axis, against time on the horizontal axis, locating a straight line which best fits the graph, and extending the line into the future. Predicted values of the variable can then be read off the extended line. Consider the graph shown in Figure 15. There has been a more or less linear increase in enrollment in Agricultural programs from 1970 to 1978. A straight line is fitted to the graph and extended to 1983. If the trend continues, the expected enrollment in 1979 would be about 8,000, 9,000 in 1980, 10,000 in 1981, etc.

Multiple linear regression. This is a more sophisticated technique which is an extension of simple linear regression. In the last section we discussed the correlation coefficient as a measure of the relationship between two variables. This relationship can also be used to predict the value of one variable where only the other is known. It should be apparent that if height and weight are perfectly correlated, knowing a person's height would also tell us his/her weight. If she/he were 5.4 feet tall, we would know that we need to add 40 pounds to 100 pounds to determine that his/her weight must be 140 pounds. If the correlation were less than perfect, we could still make an approximate estimate of weight from height, with the accuracy of that estimate decreasing as the correlation coefficient approaches zero. If we define the variable to be predicted, or estimated, as the criterion variable and the known variable as the predictor variable, the following equation states the relationship between the two:

$$\hat{y} = rx$$

where "$\hat{y}$" is the predicted or estimated value of the criterion, "x" is the known value of the predictor, and "r" is the correlation coefficient.

It is possible to extend this equation to accommodate more than one predictor variable. A criterion variable may be correlated with more than one predictor, and estimation from multiple predictors may be more accurate than estimation from any one alone. The multiple linear regression equation is:



Enrollment in Agriculture Programs (thousands)
12
11
10
9
8
7
6
5
4
3
2
1
1970
'71
'72
'73
'74
'75
'76
'77
'78
'79
'80
'81
'82
'83
Year

FIGURE 15

$$\hat{y} = a_1x_1 + a_2x_2 + a_3x_3 + \ldots\ldots\ldots\ldots a_nx_n$$

where "$\hat{y}$" is the estimated, or predicted, value of the criterion, each "x" is the known value of a predictor, and each "a" is a weighting coefficient. The weighting coefficients, usually called regression coefficients, are a special type of correlation coefficient, but they are not the simple correlation coefficients (r) between the criterion and each predictor. In practice, the value of each predictor variable is multiplied by its corresponding coefficient and products added to yield the predicted value of the criterion. A measure of the accuracy of prediction, called the multiple correlation coefficient (R), can be calculated. It is, in fact, the simple correlation coefficient between a set of actual values of the criterion and the corresponding predicted values, except that the sign is always positive. The higher the value of R, the more accurate the prediction.

The calculations of the regression coefficients and the multiple correlation coefficients are quite complex and can best be served by the use of a computer for any problem solving more than about three predictors.

To illustrate, the state of Highwater would like to predict the demand for each of its occupational programs in 1980, in order to help decide what resources should be allocated to each. Calculation of simple correlation coefficients between program demand and a number of possible predictors indicates that there is at least a moderate relationship between program demand for any given year and four variables measured two years previously: occupational demand, proportion of persons in the $5,000-$10,000 income range, change in the Gross National Product between January 1 to December 31, and change in the unemployment rate from January 1 to December 31. Since both the criterion and the predictors are known for historical data, the coefficients of the linear regression equation can be determined. These coefficients can then be used for predicting 1980 demand from data available today.

Like straight-line projection, it must be assumed that relationships which existed in the immediate past will continue to exist in the future. To the extent that this is not true, statistical prediction cannot be made.

Curvilinear Trends and Regression

In the previous discussion of straight-line projection and linear regression, it was assumed that the relationship between the variables was linear; that is, if the relationship between any two variables was plotted on a graph, a straight-line would depict that relationship. Figure 15 illustrates such a situation. This is not always the case, however. A trend may be curvilinear; that is, the line depicting the relationship between the two variables may be in the shape of a curve.

Suppose that, in the illustration in Figure 15, the rate of increase of enrollments had been slowing down, rather than continuing at a steady rate. This could be illustrated as shown in Figure 16.

Note that there is no straight-line which can be "fitted" to the data, but a decelerating curve is a fairly good approximation. The technique of locating a smooth curve that is a good approximation to a set of data points is known as curve fitting. It can be done graphically, as just illustrated, and used in the same way as straight-line projection. The only difference is that, instead of projecting a straight-line into the future, a curved-line is projected into the future.

Curve fitting can also be done mathematically with a method that is analogous to multiple linear regression. The method involves using a complex analysis of variance design, the details of which are beyond the scope of this manual.

Special Topics

Program Evaluation

Although this chapter has so far been organized around specific data analysis techniques, regardless of the planning function to which they are applied, the determination of program quality is of such importance that a special section is included to discuss some of the data analysis issues and to discuss a technique quite useful to the evaluation function of planning.

The basic problem in program evaluation, so far as data analysis is concerned, is to obtain measurements on one or more variables characterizing the vocational education process, and to relate these to one or more variables characterizing the outcomes of the process. Three models will be discussed: single predictor-single criterion, multiple predictor-single criterion, and multiple predictor-multiple criterion. All require at least the interval level of measurement.

Single predictor-single criterion model. This is the simplest and most traditional model of program evaluation. The predictor is usually mere participation in the program. The most commonly used criterion measure is placement in a training-related

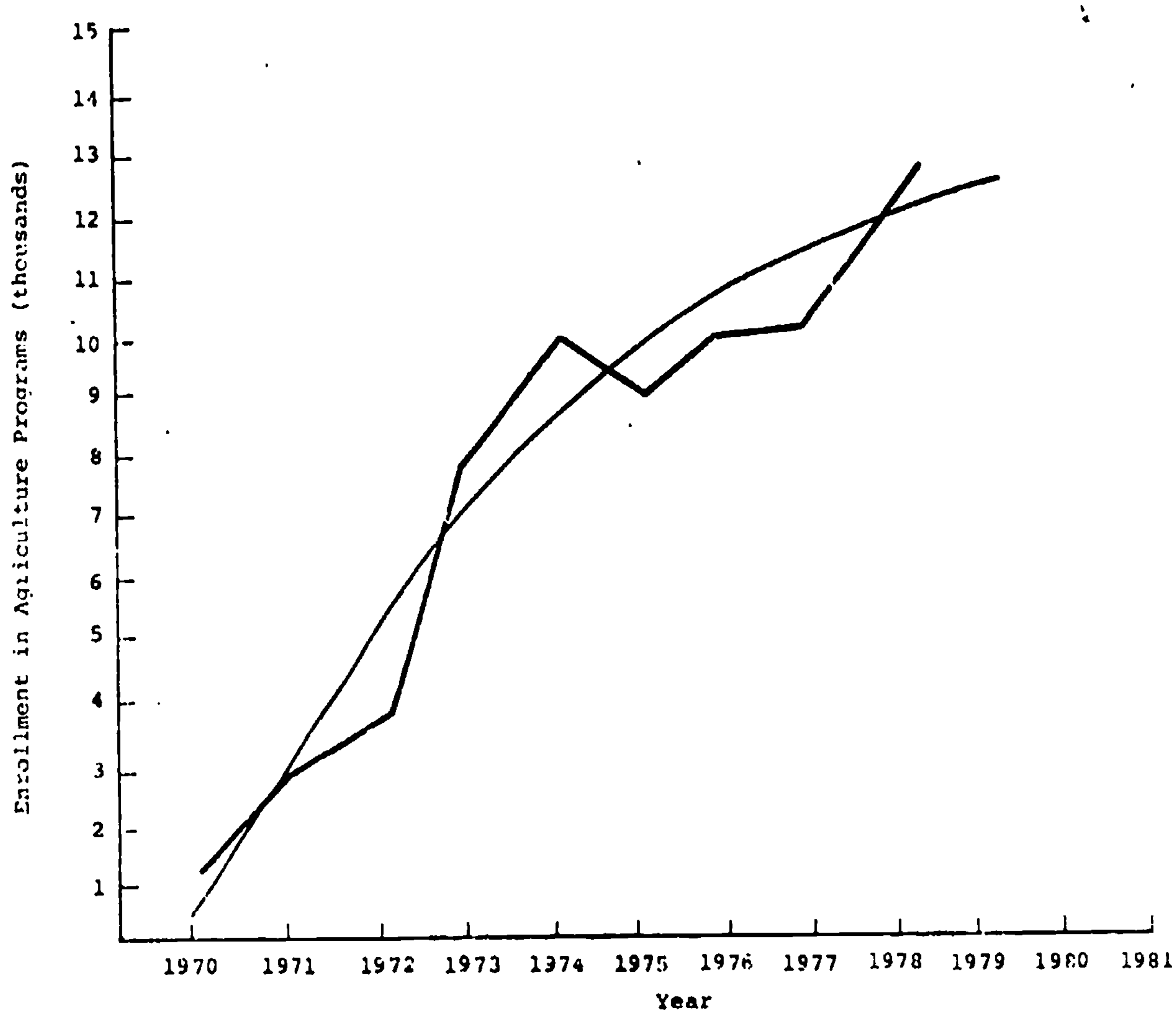

Enrollment in Agriculture Programs (thousands)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981
Year

FIGURE 16

job. The data analysis technique most often used, and a perfectly adequate one of this model, is analysis of variance of a related technique. The question is simply whether the mean placement rate in training-related jobs is higher for a group of people who took the vocational program in question compared with a group who did not. While the data analysis technique is appropriate for the model, the model itself is overly simplistic. First of all, it should be obvious that placement in a training-related job is a function of many things besides the quality of the vocational program; for example, the state of the job market. Secondly, it does not deal with any characteristics of the program, only its presence or absence. Thirdly, it deals with only one outcome, although there is every reason to suppose that participation in a vocational education program is likely to have multiple effects.

Multiple predictor-single criterion model. In this model, multiple variables are used to describe the vocational education program. The data analysis problem is one of relating the multiple predictors to a single criterion. The technique for accomplishing this has already been discussed: multiple linear regression.

Although the mechanics of the technique are the same here as in the previous discussion, its interpretation is somewhat different. We are not interested, in this case, in predicting the value of an unknown criterion from known predictors, since the values of both are already known. Rather, we are interested in construing the nature of the relationship between the predictors and the criterion.

Suppose that five variables are measured with regard to a particular vocational education program: number of years of experience of the teachers, dollars spent per student, number of books in the library, square feet of lab space available, and number of contact hours per week. One criterion will be used: success on job after being placed, as determined by employer reports. We calculate the five regression coefficients and the multiple correlation coefficient. If r is low, we must conclude that the five measured characteristics are not related to the criterion; that is, they do not determine success on the job. If r is high, then we have demonstrated that, in some combination, the five characteristics are related to success on the job.

If our only interest were in predicting success on the job, we would stop here. Our real interest, however, is in assessing the nature of the relationship. To do this, we must look at the five regression coefficients. Consider the following table:

Var. #	Variable	Coeff.
1	Years experience	.86
2	Dollars per student	.76
3	Number books	.63
4	Area lab space	.28
5	Number contact hours	.22

The size of the coefficients indicate the relative importance of each predictor variable. Regression coefficients, like correlation coefficients, range from -1.00 to +1.00. The sign of the coefficient indicates the direction of effect. In this case, we see that success on the job is primarily related to the experience of the teachers and the dollars spent per student, to a lesser extent to the number of books in the library, and hardly at all to lab space available or the number of contact hours.

The reader is cautioned that the establishment of a relationship does not necessarily imply causality. The fact that programs with more experienced teachers tend to graduate more successful students may or may not mean that teacher experience is the cause of the greater success.

Multiple predictor-multiple criterion model. Just as a vocational education program may be described by more than one variable, its outcome may also be described by more than one variable. Suppose that, in the foregoing example, we had measured four outcome variables: employer satisfaction, employee satisfaction, starting wage, and time to first pay raise. This situation can be handled by the technique of canonical analysis. This technique is similar to multiple linear regression, except that now we have both multiple predictors and multiple criteria. The linear regression equation must be expanded.

$$a_1y_1 + a_2y_2 + \ldots a_ny_n = b_1x_1 + b_2x_2 + \ldots b_mx_m$$

Coefficients can be calculated for both sides of the equation, which now states that some weighted combination of predictors is related to some weighted combination of criteria. The measure of the strength of the relationship is called the canonical correlation coefficient, although it is the same thing as the multiple correlation coefficient. Both are symbolized by the capital letter R.

In addition to the list of coefficients for the predictor variables, given above, consider the following list of coefficients for the criterion variables:

Var. #	Variable	Coeff.	
1	Employer satisfaction	.88	
2	Employee satisfaction	.33	
3	Starting wage	.77	R = .82
4	Time to first raise	.79	

We see that the previous combination of predictors is related to employer satisfaction, starting salary, and time to first raise, but not to employee satisfaction. The conclusion that can be drawn from this evidence is that students who graduate from vocational education programs with highly experienced teachers, which spend more dollars per student, and which have more books in the library rather strongly tend to satisfy employers, get higher starting wages, and get their first raise sooner; but, interestingly, they are no more or less satisfied themselves than students from other types of programs.

The multiple predictor-multiple criteria model is one of the most powerful, since it allows assessment of specific detail among both the criteria and the predictors. Has the model shown that the program "works"? Yes and no: It accomplishes certain outcomes, but not others. Further, only certain parts of the program are seen to be related to the outcomes. Asking whether a program "works" or "doesn't work" is oversimplification. Only the kind of detailed analysis described here can elucidate the intricate relationships between program characteristics and outcomes.

Resource Allocation

A second topic of vital importance to the planner is resource allocation: given limited resources, what decisions should be made about the allocation of those resources among competing claims. Up to this point, we have considered data analysis techniques as a means of generating and summarizing information. However, if this information is to be useful to those who make decisions about resource allocation, it needs to be translated into a form which will aid in the decision-making process. At the most simplistic level, this may be nothing more than verbal explanations by the planner as to the significance of the data for decision-making. There is, however, a mathematical technique for aiding decision-making called goal programming.

Goal programming is a technique for minimizing conflict among multiple conflicting goals. While the complex mathematics of goal programming is beyond the scope of this manual, its logic can be explained. Basically, the following steps are taken by the planner:

1. The goals which the planner would like to accomplish are specified.

2. The goals are ranked in order of importance.

3. Constraints to the accomplishment of the goals are specified.

4. A set of equations is specified, one for each goal, in which the goals and constraints are represented mathematically.

5. The set of equations is then solved in such a way as to maximize the average accomplishment of each goal.

Given certain mathematical decision rules, the solutions of the equations are, in effect, recommendations for apportioning resources across the various goals so that, on the average, the goals will be accomplished to the greatest extent possible.

Despite the apparent utility of goal programming, it is subject to some very severe restrictions which the planner should be aware of:

1. The planner may not be aware of all of the goals which need to be accomplished, so that not all of the necessary goals will be represented in the mathematical system.

2. The planner may not be able to assign absolute priority rankings to some goals, either because it is not clear that one is more important than another, or because there is disagreement about relative importance of goals.

3. All of the constraints may not be known, or may be too ambiguous to specify mathematically.

4. The technique utilizes certain mathematical constraints called technological coefficients, which may be either unknown, or known at the present time, but subject to rapid change.

In other words, the utility of goal programming is dependent upon the equations being a good representation of the real world, and all too often they are not.

At best, goal programming, at the present time, can be considered an aid to decision-making in situations where the parameters are reasonably well-known and specifiable. In the more amorphous resource-allocation environment usually found in vocational education, goal programming could be used as a first approximation to a distribution of resources, subject to modification by the subjective judgment of the decision-maker.

The Use of Data Base Management Systems

As noted earlier, many of the techniques described require the availability of a large variety of data which needs to be assessed in combinations appropriate for further processing. This can be most efficiently accomplished through the use of a data base management system. This is a computerized system for storing, retrieving, and updating information without the need to write computer programs. Such systems make use of any one of several commercially available software packages, such as ADABASE, SYSTEM 2000, INQUIRE, TOTAL, IMS, and others. These systems vary in their power and sophistication. Some are simply file management systems utilizing command languages only slightly less cumbersome than COBOL or FORTRAN. The most sophisticated ones use a command language which has an English-like syntax for instructing the system to manipulate the data. Another important feature of the more sophisticated systems is input-output independence. This means that the desired output need not be known at the time the data base is created. It is only necessary to decide what elements of information one wishes to have available. The output is then determined later when it is decided what inquiries are to be made.

An example of a sophisticated system for managing vocational education data is the National Center's Management Information System for Vocational Education (MISVE). MISVE consists of two components: SYSTEM 2000, one of the most powerful commercially-available data base management systems; and a data base definition, (the elements of information and their organization). The MISVE data base is organized in a hierarchical fashion as illustrated in Appendix D. Each box represents a repeating group, which is a set of related elements. Each repeating group "repeats" multiple times for each occurrence of its superior repeating group. For example, LEA ID (local education agency identification number) may repeat several times for each occurrence of COUNTY ID occurs once for each student, but STUDENT ACADEMIC DATA occurs many times for each student, once for each course taken.

The data base definition found in Appendix C contains a detailed description of each component in the data base. A component is either a repeating group or an element within a repeating group. Each line defines one component, from left to right, as interpreted below. Unexplained characters are technical requirements which have no interpretive meaning.

- The number before the asterisk is the component number.
- The text between the asterisk and the parentheses is the component name. In some cases, the first word of the name is just a code used to make unique what would otherwise be identical names. Thus, ST LAST NAME is the last name of a student, whereas SF LAST NAME is the last name of a staff member. The two element names could not both be LAST NAME alone, as the system could not then distinguish between student names and staff names. Components named RESERVED or EXTRA are undefined blank components held open for possible future use. Components named KONTROL NODE or DUMMY are for technical purposes only, and contain no real data.
- The text within the parentheses is a technical description of the component, containing information needed by SYSTEM 2000. Those which begin with RG are repeating groups; all others are elements.

As an example of how the system operates, suppose that the state of Panic wants to obtain a list of all teachers whose certificate has expired on or before December 31, 1978, and to determine what districts they are teaching in. The following command, keyed into an interactive terminal, would produce a list of the names and locations of all such teachers, in alphabetical order:

```
LIST SF LAST NAME, SF FIRST NAME, SF MI, SA LEA CODE,
ORDERED BY LOW SF LAST NAME, SF FIRST NAME, SF MI WHERE
SC CRED EXP DATA LE 12/31/78:
```

The same command could have been coded using component numbers instead of component names and certain command abbreviations.

```
LIST C101, C102, C103, C174, OB LOW C101, C102, C103
WH C151 LE 12/31/78:
```

In both of the above commands, the code LOW directs the system to order the list from low to high; (A-Z), and the code LE means "less than or equal to." To cite an example more related to planning, suppose that it is desired to do a chi-square to determine whether there is a significant difference between white and non-white enrollment in all Health Occupations. MISVE could easily produce a data table which could then be input into commonly available statistical analysis systems. The following will produce the necessary data from aggregate counts stored in the data base.

```
LIST/STUB SUPPRESS/BT NUM WHITE, SUM (BT NUM SPANISH +
BT NUM BLACK + BT NUM ASIAN PI + BT NUM AMER INDIAN)
WHERE FIELD EQ HEALTH:
```

A modification of the above command would produce the same data table from individual student records.

Summary

A wide range of data analysis techniques has been described in this chapter which have relevance for vocational education planning and decision-making with respect to formulating goals and objectives, allocating resources, and monitoring and evaluating a plan. Many of the concepts and techniques which are described are too complex to be fully understood by persons unfamiliar with statistical methods from the brief explanations given about them in this chapter. The intent of this chapter is to promote awareness of the different ways in which data analysis techniques can be useful tools for dealing with planning tasks. For those planners who are unfamiliar or uncertain about the applicability of particular data analysis techniques to specific planning problems, technical assistance should be sought from a competent statistician or apprcpriate statistical texts.

CHAPTER IV

COMMUNICATING ANALYZED DATA THROUGH EFFECTIVE USE OF DATA DISPLAYS

This chapter describes selected data display techniques which are useful for effectively communicating data pertinent to vocational education planning. There is a variety of ways of presenting or displaying data. The three basic display techniques are: textual, tabular, and graphic. A textual display is a narrative presentation which is best suited to information that is basically nonquantitative. This type of display will not be the focus here, since the central concern of this manual is with quantitative data relevant to planning vocational education.

Tabular and graphic forms of presentation are most common for displaying quantitative data. The tabular form arranges numbers in columns and rows, while the graphic technique utilizes points, lines, areas, and other geometric forms to represent the quantities indicated by the numbers.

Whether graphic or tabular techniques are used, three factors underlie satisfactory display of quantitative data: simplicity, clarity, and effectiveness. The graphic and tabular forms of data display must be easily read and understood, and must be presented in a manner which will facilitate ease of comprehension and retention. These purposes require consideration of: (a) the nature of the data; (b) the purpose of the display; (c) the medium for presenting the data; and (d) the audiences to whom the data are presented. One or all of these factors may be pertinent to any situation where data are presented or displayed.

Each data type may require a unique form of display to maximize the effectiveness of communication. Likewise, the purpose of the display is important since one may desire to direct attention to some special aspect of the data presented. The medium for presenting the data can also vary, thus dictating to size and substance of the display. The audiences to whom the data displays are directed may have varying interests and different levels of educational attainment and technical knowledge, and these may influence the content and complexity of displays.

Consequently, displays of data must be expertly tailored to maximize the impact of the data presented and the effectiveness of communicating these data.

Alternatives for Displaying Data

Effective displays are advantageous in many ways:

- they create interest and call attention to message
- they facilitate easy comprehension and retention of the data which are portrayed
- visualization of large masses of data at a glance is made possible
- problems are presented in a comprehensive picture
- the ability of effective data displays to bring out hidden facts and relationships can stimulate and aid analytical thinking

The following pages present a series of alternatives for effectively displaying data. The unique characteristics of each alternative display technique are mentioned where applicable, and examples are provided of data which can be presented with each technique. It should be noted, that no inference is made about the best display technique for each kind of data.

The various alternatives are presented for the purpose of providing the user with the opportunity of selecting a display technique, or combining attributes of various techniques, to adequately communicate the information of concern to the intended audience. Moreover, it is hoped that the categorization and examples of display techniques presented will enable the user to develop a more purposeful approach to displaying data, and stimulate creative abilities to design display schema best suited to each unique situation. It is also hoped that a sense of awareness is created to motivate the user to observe (and possibly collect) examples of interesting and effective ways of displaying data.

For ease of comprehension, tabular and graphic display techniques are treated separately; and, where appropriate, the following general aspects of each technique are explained:

- display form
- advantages, disadvantages, or purpose where applicable

- cautionary notes

Following the explanations for each display technique, specific examples are presented with comments. Furthermore, we have tried to present examples that reflect the data presentation concerns of vocational educators. Alternative data sets which can be similarly presented are also listed.

It may be helpful to note that in presenting tabular forms of display, the focus is on variations in column and row designations to effectively maximize the content of tables. But because of numerous variations, the graphic displays are subdivided into the following types:

- line graphs
- bar and column charts
- pie charts
- flow charts
- pictorial charts

Each graphic display is treated and illustrated separately.

Tabular Displays

Display Form

With tabular displays, the body of the table is filled with data in the form of quantitative values. The data are organized and given logic by correct headings, and by the appropriate use of lines as separators or dividers. These dividers and headings conceptually allocate the data into various classes for the purpose of comparison.

Purpose

The purpose of tabular displays is to compare or classify related data items.

The complexity of data to be represented in a table is a major determinant of its structure. As a result, various types of table headings are used to accommodate varying degrees of complex data. These headings are commonly referred to as stubheads, boxheads, column heads, and spanner heads. The nomenclature is explained below, and an example of each is shown in Table 1.

Stubheads. A stubhead is placed at the top of the left hand column to describe the elements listed in this column (stub column). These elements usually identify the data in each row.

Boxheads. A boxhead identifies the entries in the vertical columns in the body of the table.

Column heads. Each column head identifies a separate vertical column of the table.

Spanner heads. Spanner heads allow for further division within the body of the table, and can be used to combine two tables into one.

In addition to heading types, Table 1 illustrates the categorization of enrollment according to three factors: sex, program type, and instructional program. The structure of the table should vary in complexity if the number of variables considered in investigating enrollments is changed. As the number of variables increases, the complexity in the structure of the table should increase.

Tables 2 through 9 are intended to show the use of column and row designations to change the structure of the table to accommodate an increasing number of variables. A brief explanation is provided contiguous to each table to highlight the inclusion of variables for which the structure of the tables have been changed.

TABLE 1

HEADINGS ASSOCIATED WITH TABULAR PRESENTATION OF DATA

Number of enrollees by post-secondary program type, sex and instructional program

Boxhead

Stubhead

Sex	post-secondary program type		
	Adult Long Term	Adult Short Term	AA
Distributive Education			
Male	100	150	200
Female	50	20	150
Agriculture			
Male	200	50	20
Female	170	30	10

Column heads

Spanner heads

Table 2 presents a simple tabular form. Only two variables are considered--post secondary program designation (stub) and the number enrolled (column).

TABLE 2

TABULAR FORM CONSIDERING TWO VARIABLES: PROGRAM DESIGNATION AND ENROLLMENT.

Post-secondary program designation	Number enrolled
Short-term adult	5,500
Long-term adult	12,200
AA degree	15,000
Total	32,700

The variable "sex" is added to the two variables in Table 2. Placement of this variable--"sex"--is in the Column head in Table 3, and the Stub column in Table 4. Placement of additional variables is usually determined by space requirements, appearance, and the ability to facilitate comprehension and retention.

TABLE 3

TABULAR FORM CONSIDERING THREE VARIABLES--
PROGRAM DESIGNATION, ENROLLMENT AND SEX.

Post-secondary program designation	Number Enrolled		Total
	Male	Female	
Short-term adult	5,000	500	5,500
Long-term adult	10,000	2,200	12,200
AA degree	10,000	5,000	15,000
Total	25,000	7,7000	32,700

TABLE 4

TABULAR FORM CONSIDERING THREE VARIABLES--
PROGRAM DESIGNATION, ENROLLMENT AND SEX.

Post-secondary program designation	Number Enrolled	
Short-term adult	5,500	
Male		5,000
Female		500
Long-term adult	12,200	
Male		10,000
Female		2,200
AA degree	15,000	
Male		10,000
Female		5,000
Total	32,700	

Another variable--instructional program type--is added to better understand the characteristics of enrollment. Table 5 shows the inclusion of this variable in the three boxheads, while Table 6 uses spanner headings to accommodate this in addition to another variable--institution. In Tables 5 and 6, a total column can be added for each program, or across all programs, showing totals and subtotals for each category of program designation (see Tables 7 and 8).

In Table 9 another variable--age category of enrollees--is added to shed more light on the characteristics of enrollment. If desired, Table 9 can be extended to include enrollment totals and subtotals similar to those found in Tables 7 and 8.

TABLE 5

TABULAR FORM PRESENTING FOUR VARIABLES: PROGRAM DESIGNATION, ENROLLMENT, SEX, AND INSTRUCTIONAL PROGRAM

Post-secondary program designation	Number Enrolled					
	AG		DE		Home Ec.	
	Male	Female	Male	Female	Male	Female
Short-term adult	1,000	1,000	1,400	1,050	50	1,000
Long-term adult	2,500	3,000	1,000	1,200	1,000	3,500
AA degree	2,000	500	2,500	2,500	1,500	2,500
Total	5,500	4,500	4,900	4,750	2,550	7,000

TABLE 6

POST-SECONDARY ENROLLMENT BY SEX OF ENROLLEES, TYPE OF INSTRUCTIONAL PROGRAM, AND INSTITUTION OF ENROLLMENT

Post-secondary program designation	Number Enrolled					
	AG		DE		Home Ec.	
	Male	Female	Male	Female	Male	Female
	Staples AVTS					
Short-term adult	200	400	125	628	280	400
Long-term adult	600	800	725	283	400	600
AA degree	250	720	496	300	200	750
	Alexandria AVTS					
Short-term adult	280	300	420	125	200	600
Long-term adult	425	620	670	250	375	750
AA degree	723	350	325	150	110	250

TABLE 7

TABULAR FORM PRESENTING FOUR VARIABLES: PROGRAM DESIGNATION, ENROLLMENT, SEX, AND INSTRUCTIONAL PROGRAM

Post-secondary program designation	Number Enrolled									
	AG			DE			Home Ec.			Grand Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Short-term adult	1,000	1,000	2,000	1,400	1,050	2,450	50	1,000	1,050	5,500
Long-term adult	2,500	3,000	5,500	1,000	1,200	2,200	1,000	3,500	4,500	12,200
AA degree	2,000	500	2,500	2,500	2,500	5,000	1,500	2,500	4,000	11,500
Total	5,500	4,500	10,000	4,900	4,750	9,650	2,550	7,000	9,550	29,200

TABLE 8

POST-SECONDARY ENROLLMENT BY SEX OF ENROLLEES, TYPE OF INSTRUCTIONAL PROGRAM, AND INSTITUTION OF ENROLLMENT

Post-secondary program designation	Number Enrolled									
	AG			DE			Home Ec.			Grand Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
	Staples AVTS									
Short-term adult	200	400	600	125	628	753	280	400	680	2,033
Long-term adult	600	800	1,400	725	283	1,008	400	600	1,000	3,408
AA degree	250	720	970	496	300	796	200	750	950	2,716
	Alexandria AVTS									
Short-term adult	280	300	580	420	125	545	200	600	800	1,925
Long-term adult	425	620	1,045	670	250	920	375	750	1,125	3,090
AA degree	723	350	1,073	325	150	475	110	250	360	1,908
Total	2,478	3,190	5,668	2,761	1,736	4,497	1,565	3,350	4,915	15,080

TABLE 9

TABULAR FORM CONSIDERING FIVE VARIABLES: POST-SECONDARY ENROLLMENT, SEX OF ENROLLEES, TYPE OF INSTRUCTIONAL PROGRAM, INSTITUTION OF ENROLLMENT, AND AGE CATEGORY OF ENROLLEE

Post-secondary program designation by age category	Number Enrolled					
	AG		DE		Home Ec.	
	Male	Female	Male	Female	Male	Female
			Staples AVTS			
Long-term adult	500	400	400	550	10	700
15-25 yrs.	100	50	100	150	1	200
26-35 yrs.	250	100	150	100	3	150
36-50 yrs.	50	100	100	150	2	150
50+	100	150	50	150	4	200
Short-term adult	1,500	1,000	500	500	300	1,300
15-25 yrs.	800	450	200	150	75	400
26-35 yrs.	300	200	100	50	25	700
36-50 yrs.	100	250	150	100	100	150
50+	300	100	50	200	100	50
AA degree	1,000	200	1,000	1,000	600	1,300
15-25 yrs.	600	75	350	400	150	450
26-35 yrs.	225	75	250	500	200	350
36-50 yrs.	75	25	300	75	150	400
50+	100	25	100	25	100	100
			Alexandria AVTS			
Short-term adult	500	600	1,000	500	40	300
15-25 yrs.	225	220	600	250	10	100
26-35 yrs.	100	100	200	150	10	100
36-50 yrs.	75	80	150	75	10	25
50+	100	200	50	25	10	75
Long-term adult	1,000	2,000	500	700	700	2,200
15-25 yrs.	400	600	200	150	200	400
26-35 yrs.	300	400	100	150	200	600
36-50 yrs.	125	600	150	150	200	400
50+	175	400	150	250	100	800
AA degree	1,000	300	1,500	1,500	900	1,200
15-25 yrs.	500	100	800	600	300	500
26-35 yrs.	310	75	400	400	300	500
36-50 yrs.	80	25	150	100	150	100
50+	110	100	150	400	150	100

Cautionary Notes

The following cautionary notes should be observed when preparing tables:

- Footnotes can be used with each table to qualify, explain, or provide information relating to the table as a whole, or to refer to a particular column or individual entry.
- Care should be taken not to overload tables with variables. Too many variables may detract from the intended purpose of facilitating ease of comprehension and comparison.
- It is best to avoid placing lines between each row designation, since too many lines may detract from the homogeneous appearance of the table. However, these lines may be used when an abundance of blank spaces makes it difficult to assign numbers to their appropriate columns.
- The table should be intelligible without reference to the text or narrative referring to it.
- Entries must be properly aligned to clarify relationships within a table. This is of critical importance when vertical lines are not used to separate individual columns.
- When considering the tabular form for displaying data, variables may be included as follows:
  - as column heads or boxheads at the top of the table
  - as major designations in the stub column, or as subcateogries under these major designations
  - as spanner heads spanning the width of the table, providing that the column headings at the top of the table possess categories common to each spanner heading

The placement of additional variables is dependent on the number of categories within these variables

Graphic Displays

The following subsections explain and illustrate information pertinent to graphic displays. As previously mentioned, these displays differ from tabular displays since points, lines, area and other geometric forms are used to represent the quantities indicated by numbers. These geometric forms are combined in various ways to "translate" an array of numbers into a structure which will efficiently impart the information within the array. Each subsection represents a category of techniques used for this purpose.

Line Graphs

Display Form

This type of display is characterized by the plotting of one or more series of values along two scales and joining the successively plotted points together in the form of a continuous line.

Advantages

The plotted line 'catches' the eye, and readily shows minimum and maximum values as well as the general direction of rise or fall. It enables close reading or interpretation with little expenditure of effort.

Uses

Line graphs may be appropriately used when:

- there is a series with many successive values to be represented e.g., trends or improvements over a period of years
- there are several series or trends to be compared on the same chart
- emphasis is to be placed on movement rather than actual amounts

Line graphs may be inappropriately used when:

- relatively few plotted values are in the series
- emphasis should be on change in amounts rather than on the movement of a series
- the desire is to emphasize the difference between values or amounts on different dates
- movement of data is extremely violent or irregular
- the data display is designed for popular appeal

Examples

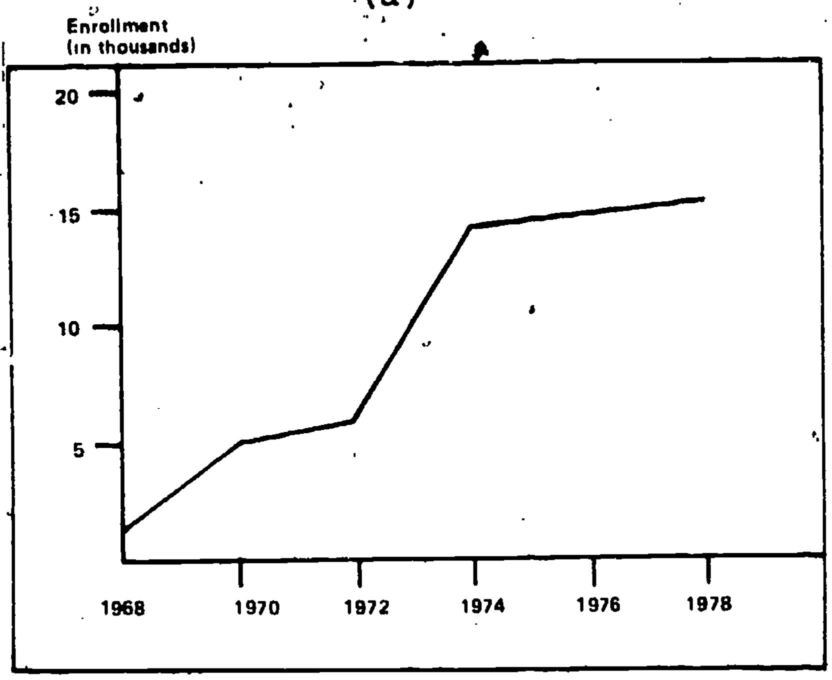
The following illustrations represent a selection of commonly used techniques in portraying line graphs. Figure 17 portrays frequently used line graphs, while Figure 18 shows the use of shading for accentuation and facilitating comprehension.

FIGURE 17

ENROLLMENT OVER A TEN-YEAR PERIOD

(a)

Figure 17(a) shows a simple line graph used for plotting total vocational education enrollment over a ten year period. The scale caption shows enrollment in thousands.



(b)

In Figure 17(b) enrollment is plotted over the same ten year period with a trend line inserted. This trend line facilitates ease of interpretation. It clarifies the fact that there is a general tendency for enrollment to rise over the ten year period, thus adding an interpretative or explanatory dimension to the simple line graph.

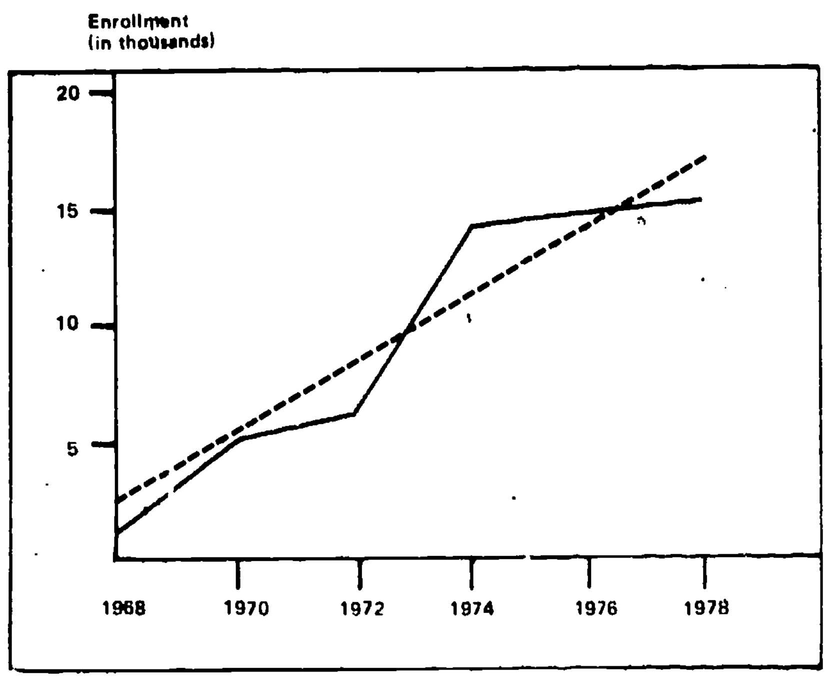


FIGURE 17

ENROLLMENT COMPARED TO NUMBER OF APPLICANTS

(c)

When enrollment is compared to the number of applicants it may provide even more information. Over the time period, both the number of applicants and the number of students enrolled have increased. The two plotted lines in Figure 17(c) show that the percentage increase in the number enrolled is greater than the increase in the number of applicants. From this, one can infer a number of possible reasons: fewer applicants are rejected; there is an increase in the capacity of the vocational education system to accommodate more applicants, etc.

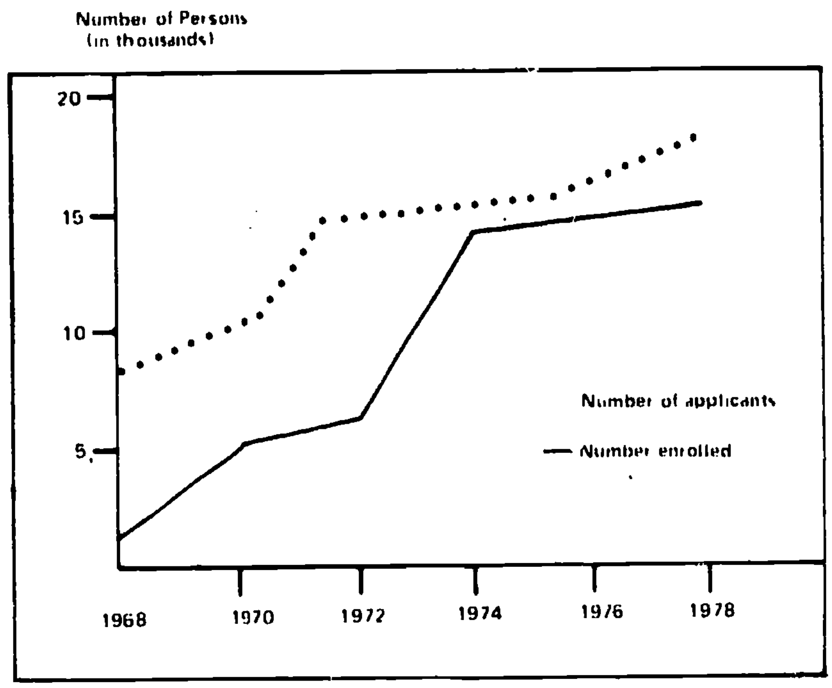
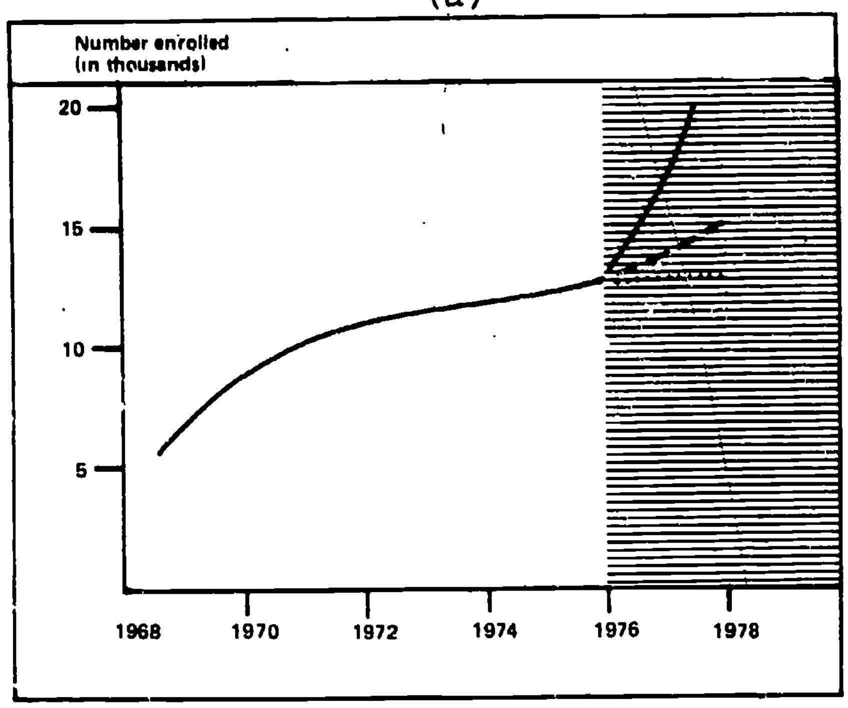


FIGURE 18

ILLUSTRATING THE USE OF SHADING

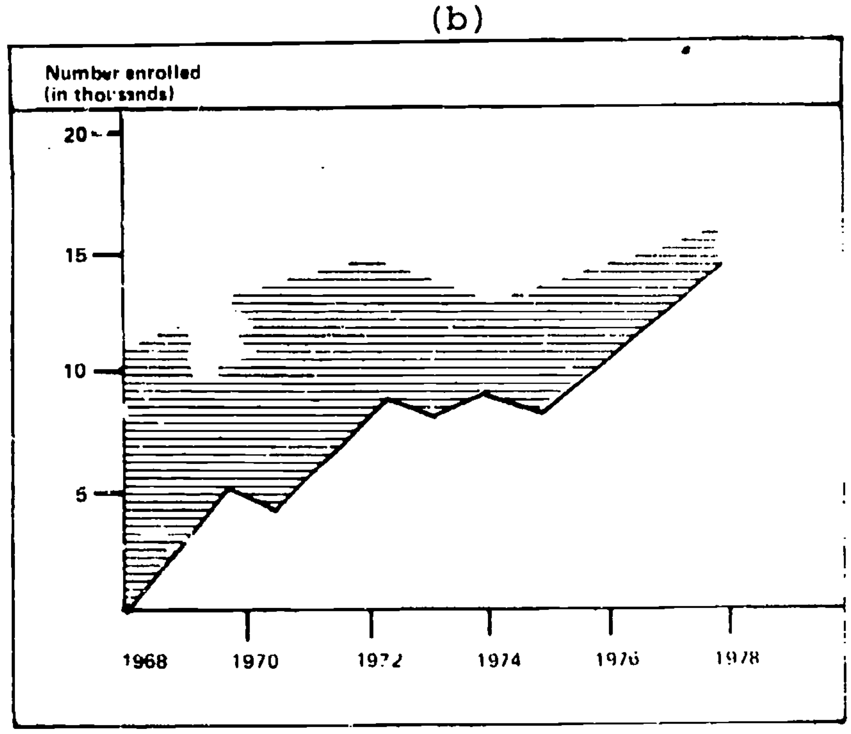
In Figure 18(a) shading is used to show the area of uncertainty when the enrollment trend is projected. The shading accentuates the fact that no one can be totally confident about the magnitude of enrollment beyond the present time. Using various assumptions about the future, alternative projections can be made.

(a)



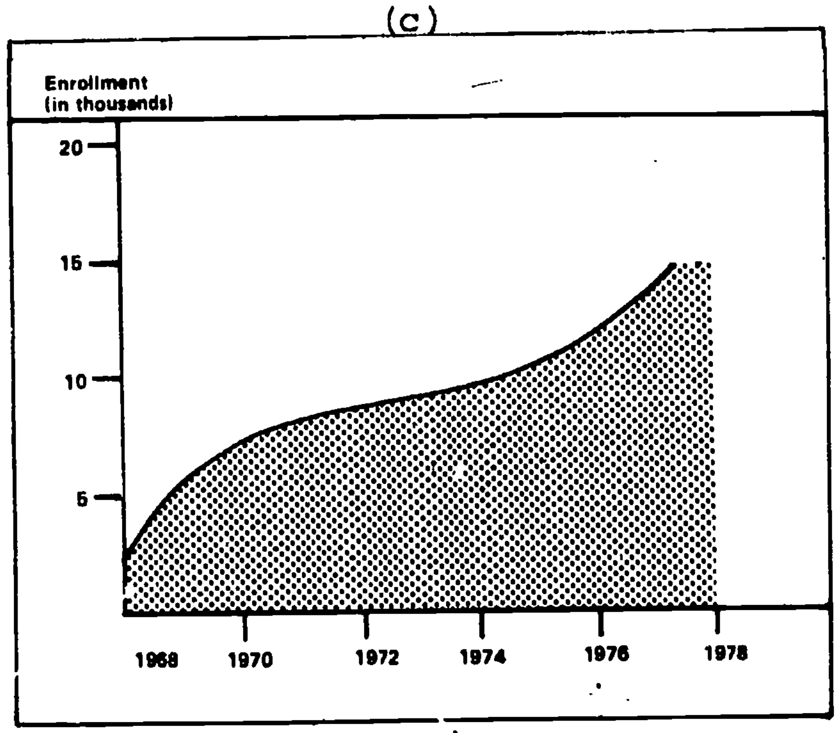
Shading is used in Figure 18(b) to highlight the difference between the total number of persons applying to enter various programs and the total number enrolled in vocational education. As the shaded portion becomes smaller, it graphically indicates that an increasing number of applicants are accepted, or that the number of persons unable to gain entry has decreased over time.

(b)



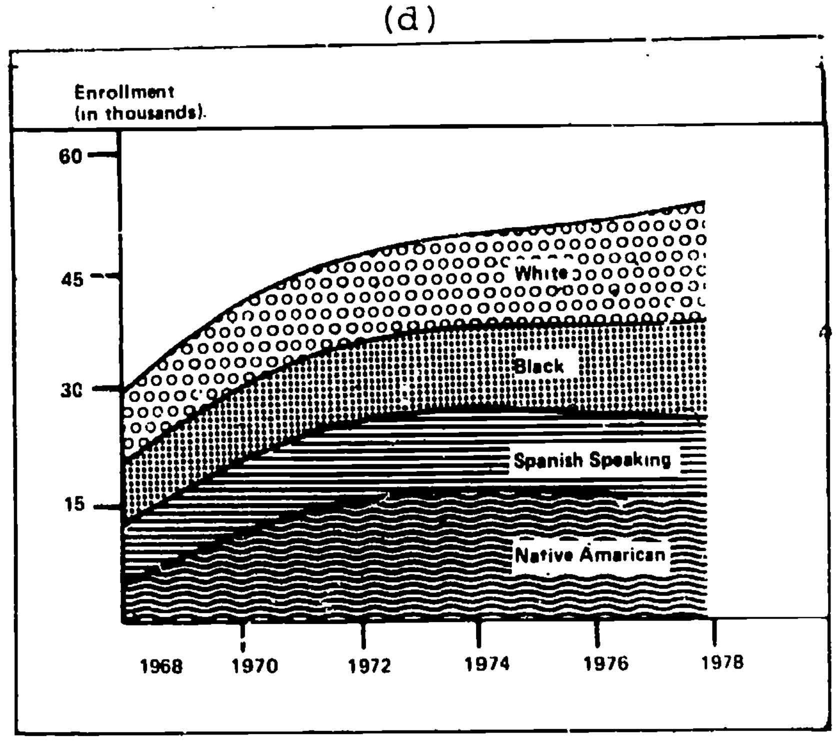
The shading in Figure 18(c) highlights the area under the plotted line. The shaded area tends to emphasize the change in quantity (enrollment). Attention is redirected from the movement of the line to the actual magnitude portrayed by its movement. The line graph is actively compared to a point of reference--the horizontal axis.

(c)



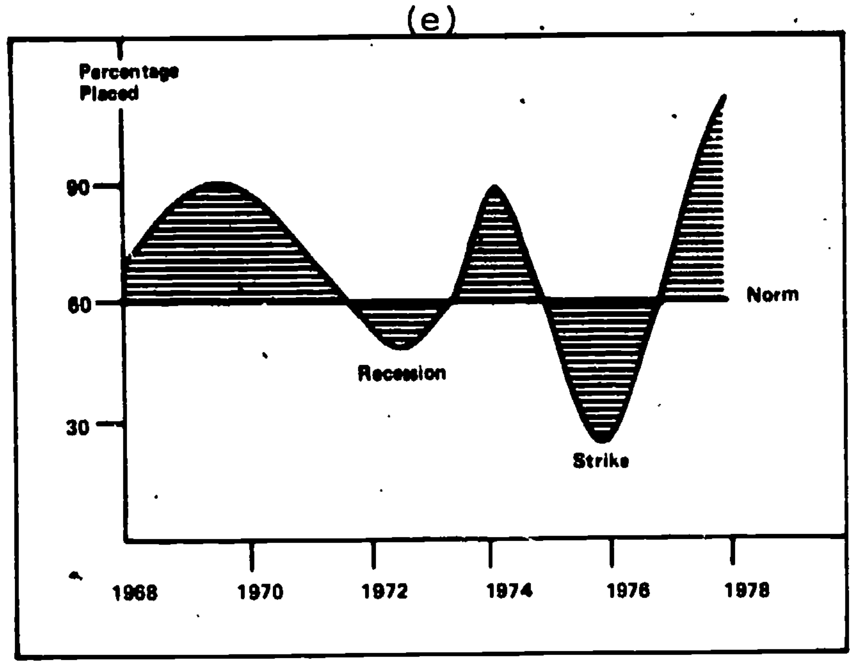
Multiple shades are used in Figure 18(d). These shaded surfaces show enrollment trends by racial characteristics. The chart clearly differentiates the trends in both the total and component values of the series. Hence, one can compare the enrollment trend for each racial group, to the total enrollment in vocational education.

(d)



In Figure 18(e), the placement rate in one program (building construction) is compared to an acceptable norm, and reasons are given for deviations below that norm. Again shading helps to highlight magnitude. The figure illustrates that a recession between 1972 and 1974, and a strike in the Industry in 1976, were responsible for the unacceptable placement rates.

(e)



Cautionary Notes

The following cautions should be observed when preparing line graphs:

- The title of the chart should be placed at the top. Care should be taken to eliminate all superfluous words by asking three basic questions: what? where? and when?
- The title must be tailored to the audience.
- The number of lines or trends represented on a chart should be based on its potential use, the size of the chart, and the clarity of the coding system. It is wise to remember that the effort is to aid and not to retard comprehension of the data.
- No more lines should be used in the formation of a grid than those which are necessary to guide the eye in reading values.
- The scale should be kept simple, and the scale caption made to contain the information (e.g., the omission of zeros must be shown in the scale caption).

Bar or Column Charts

Display Form

The bar or column chart is directly related to the line graph. It is drawn from a series of values plotted against two axes, but instead of being joined by a line, the values are represented by vertical bars. Each bar is usually kept separate from its neighbor, with the length of the bar proportioned to the quantity represented. The distinguishing feature between bar and column charts is whether the bars or columns are drawn vertically or horizontally; the bars are horizontal, while the columns are drawn vertically.

It is important to note that one bar (or column) in a graph emphasizes actual quantity (it does not show changes in quantity).

Advantages

The bar or column chart has a number of advantages as a data display technique; these include the following:

- It is particularly useful when information consists of distinct units (months, years, programs.)

- Columns can be turned on their sides, so that the placement of letters enables easy reading.

- It is particularly appropriate for comparing the magnitude or size of coordinate items or parts of a total.

- It enables the eye to readily appraise the basic difference in the size of bars, and hence in the magnitude of the quantity represented.

Examples

Figures 19 through 29 illustrate alternative ways of displaying data through the use of bar or column charts.

FIGURE 19

SIMPLE BAR CHARTS

This simple bar chart shows enrollment in each program. The length of the bar is proportional to the number of students enrolled in each program.

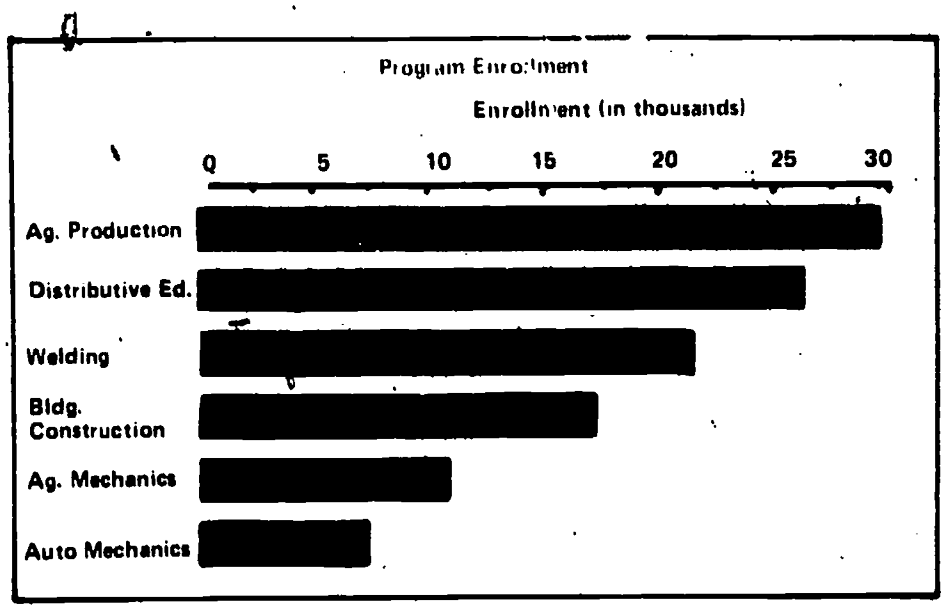


FIGURE 20

BAR CHART USED TO INDICATE MAGNITUDE AND COMPARISONS

The bar chart illustrated here is used to indicate the magnitude of enrollment in each program, and to compare current enrollment with enrollment in the preceeding year.

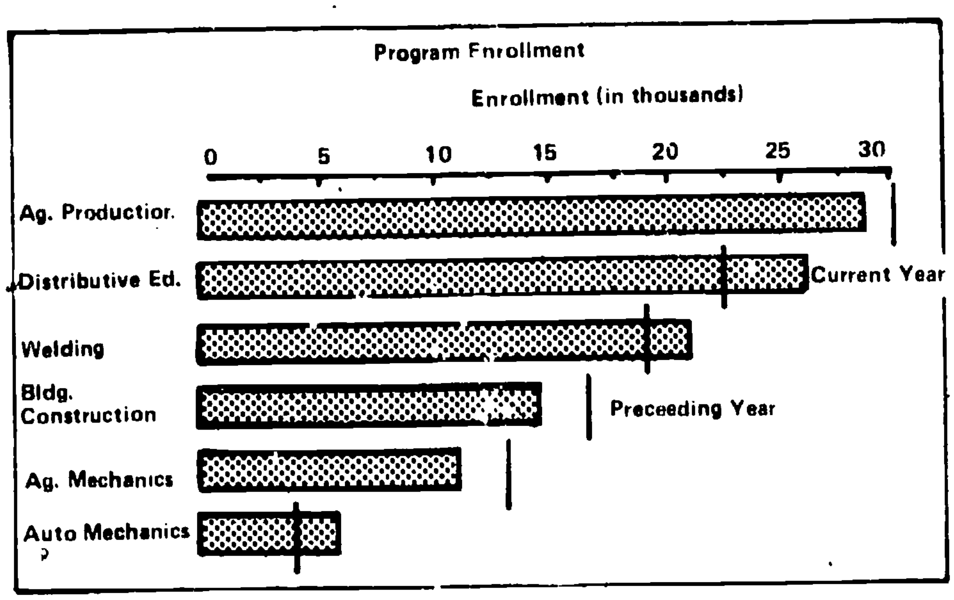


FIGURE 21

BAR CHART USING SHADING TO EMPHASIZE DIFFERENCE IN MAGNITUDE

This bar chart shows enrollment in programs by race. The size of each shaded portion represents the magnitude of enrollment in each racial category.

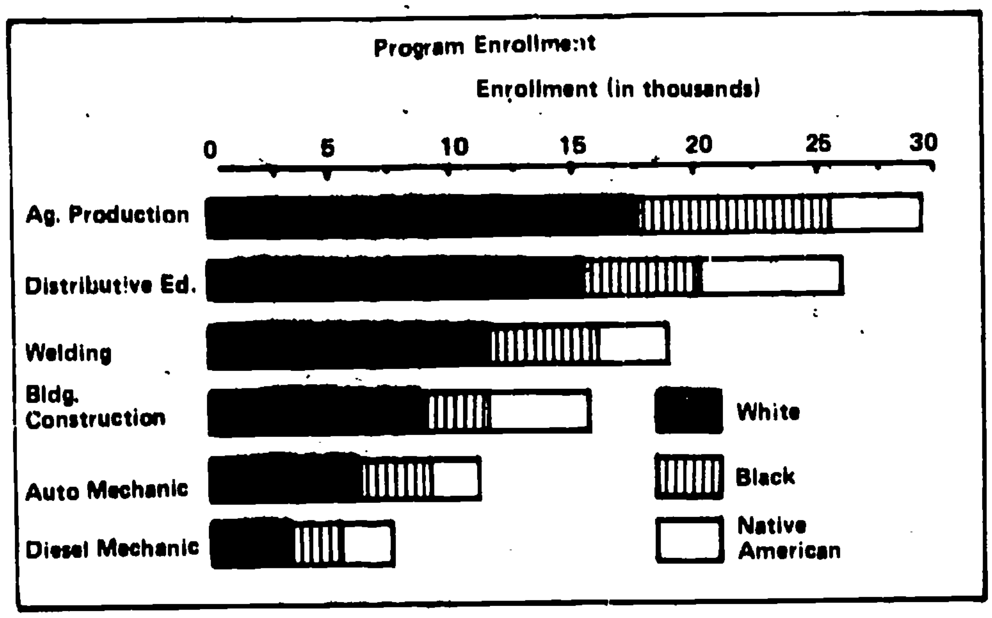


FIGURE 22

BAR CHART USED TO REPRESENT PERCENTAGES

The 100% bar chart has various sections representing percentages of the whole. This figure facilitates comparison of enrollment in each racial category by program. The program with the largest percentage enrolled in each racial category is immediately visible. Its main purpose is to facilitate valid comparisons.

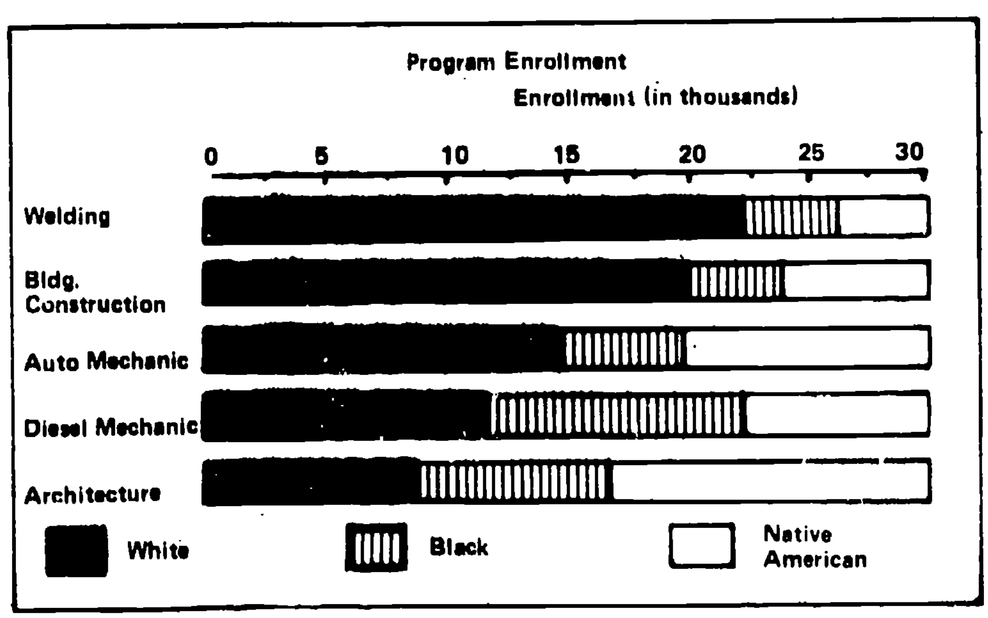


FIGURE 23

THE GROUPED BAR CHART

The grouped bar chart in Figure 23 allows comparison of the number of persons of each sex enrolled in each program. This chart can be adjusted to accommodate up to three divisions in each category (or program).

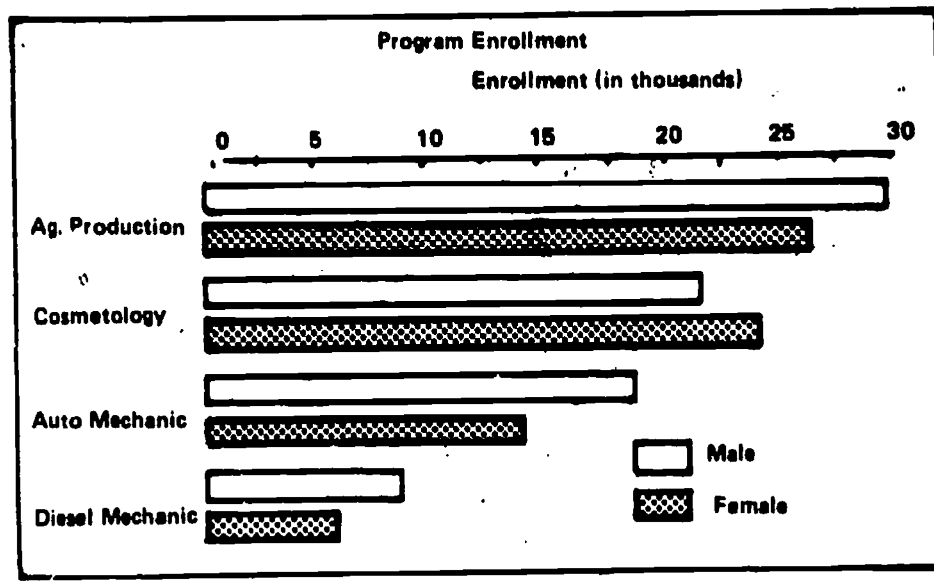


FIGURE 24

THE PAIRED-BAR CHART

The paired-bar chart in Figure 24 also compares the number of persons of each sex enrolled in each program. Although this format is similar to Figure 23, it is limited to only 2 divisions within each category.

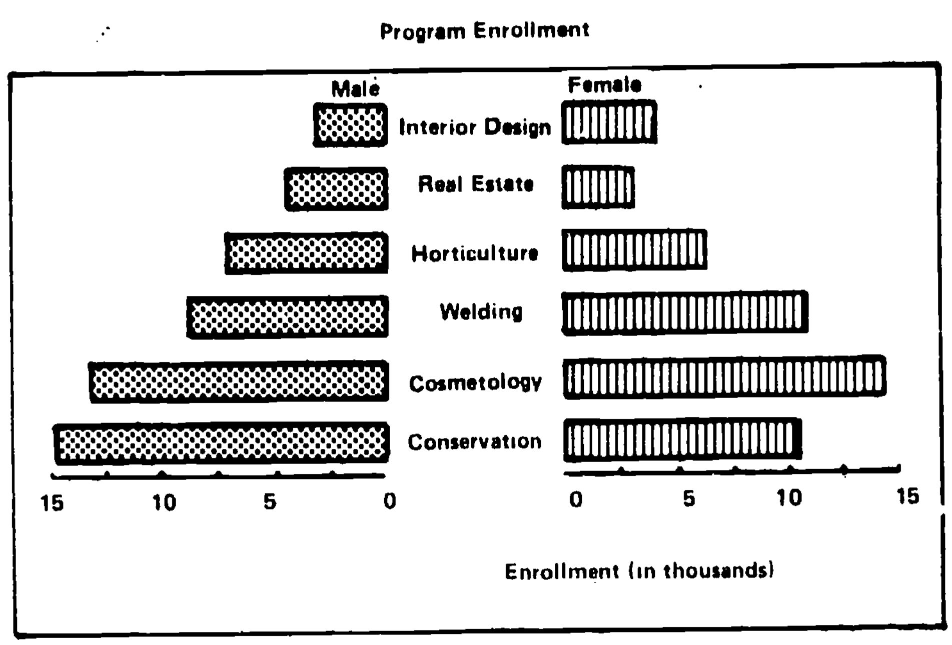


FIGURE 25

A MORE COMPLEX PAIRED-BAR CHART

The adjacent figure shows a comparison of funding and placement rate for each program in each of two years. Here, insertion of the time dimension is an effective extension of Figure 25.

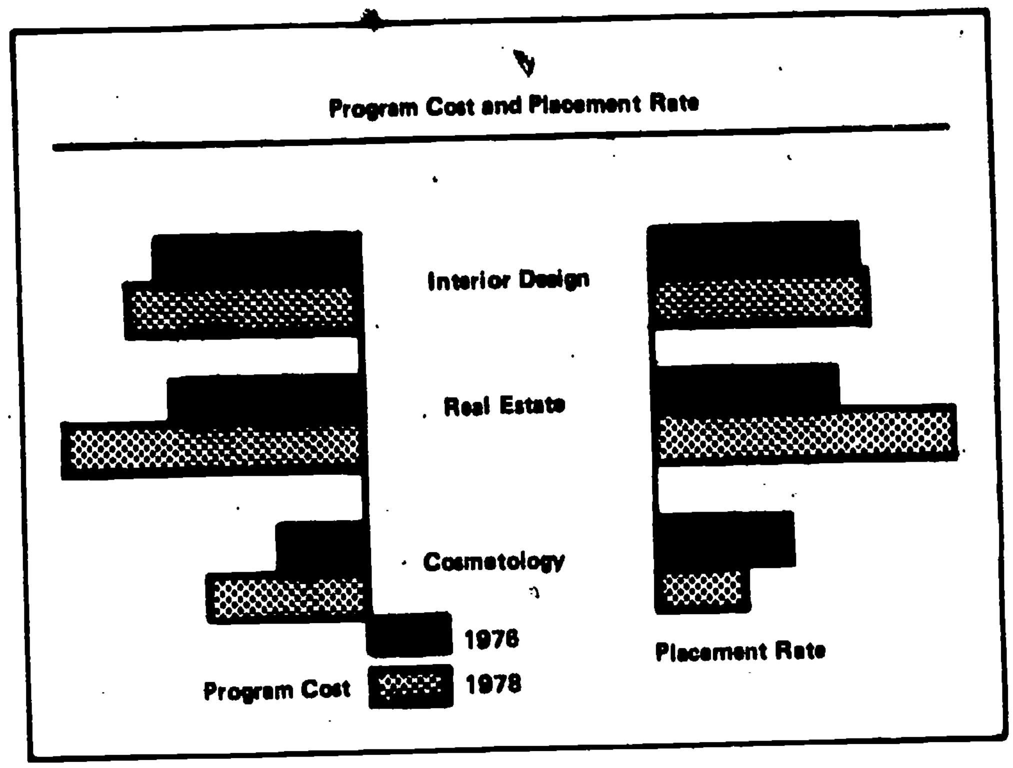


FIGURE 26

THE STEP-BAR CHART

Figure 26 illustrates a step-bar chart showing the sources of dollars for vocational education. Where space allows, the step-bar chart is much easier to understand, and has the potential of creating greater interest. Different shading in a single bar could also be used with a descriptive key to portray even more information.

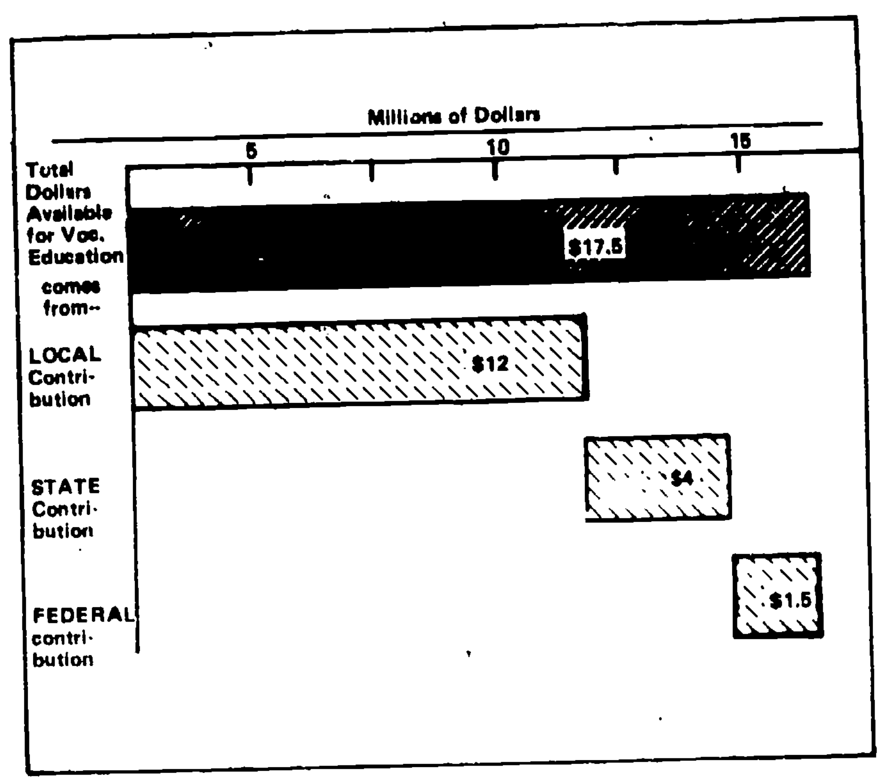


FIGURE 27

THE OVERLAPPED BAR CHART

Where space is limited, bars can be overlapped as shown in Figure 27. The figure shows percentage placement by race for each program area. The overlapping columns clearly represent their respective categories with much economy in space.

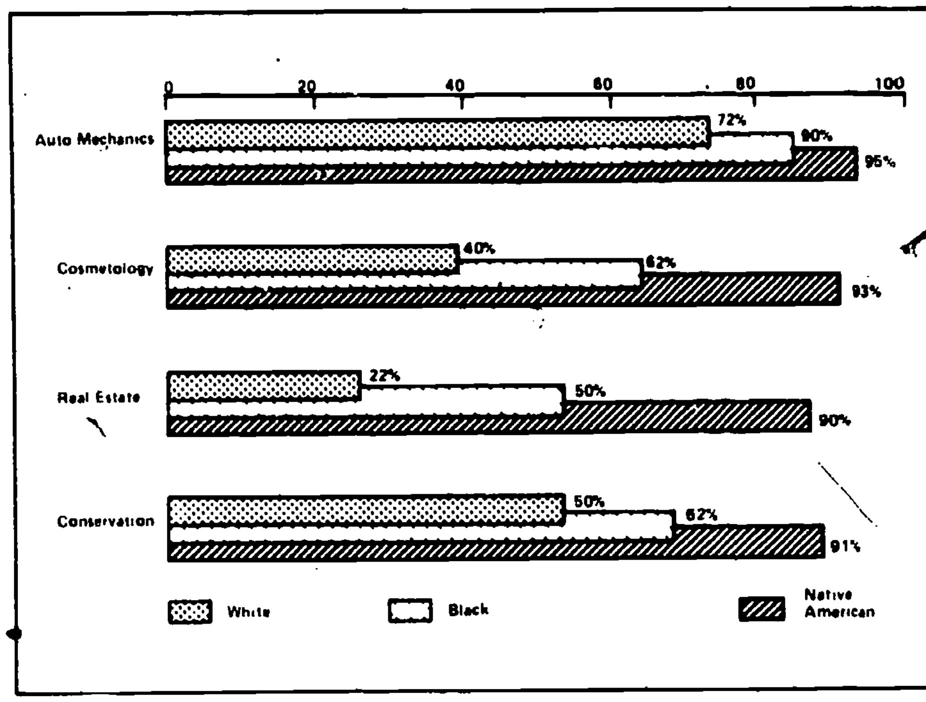


FIGURE 28

THE PYRAMID BAR CHART

This variation of a bar chart is referred to as a population pyramid. It shows the total number of male and female enrollees in vocational programs by age category, and the increase in enrollment over two time periods.

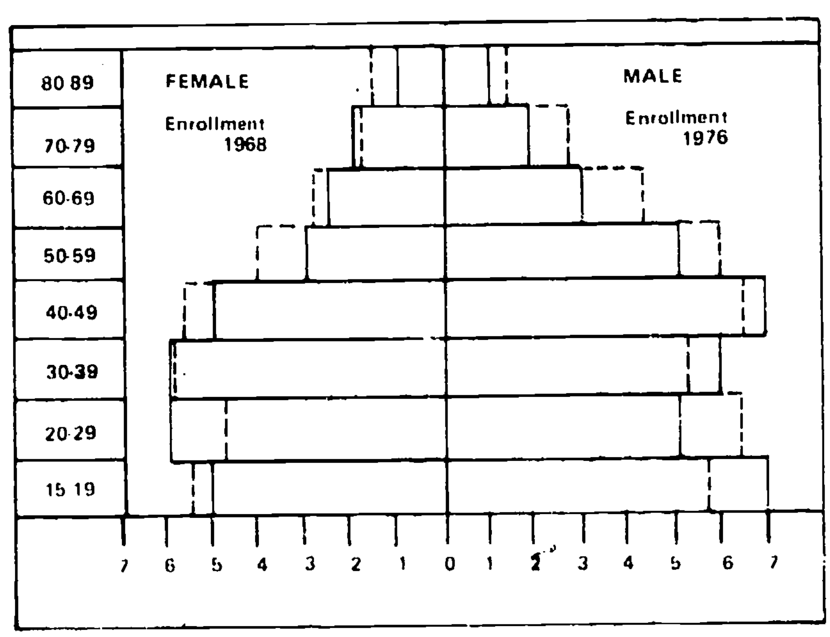
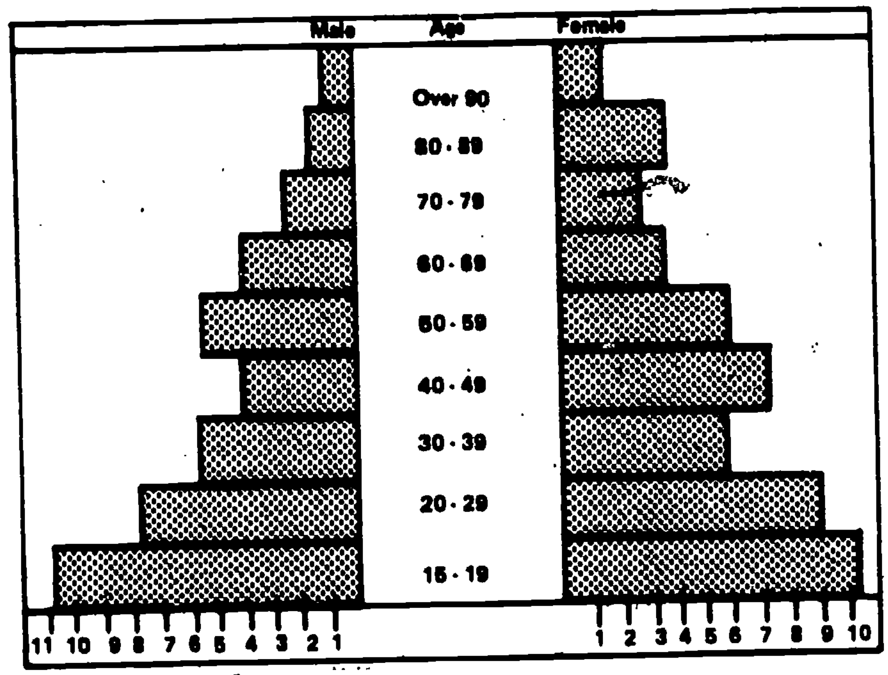


FIGURE 29

AN ALTERNATIVE PYRAMID BAR CHART

This is another population pyramid showing the total number of male and female enrollees in vocational education programs by age category. Insertion of the age category in the middle of the chart enhances its appearance and economizes in the use of space.



Cautionary Notes

The following cautions should be observed when using bar or column charts:

- Adapt arrangements of bars to the purpose of the display. Usually bars are arranged in order of size, but sometimes geographic subdivisions or other concerns may be most appropriate and hence, these can be used as the basis for arrangement.

- The width of bars should be uniform and should be based on the number of bars and the spacing between them. Care should be taken so that bars are not disproportionately long and narrow, or short and wide.

- The scale of the bar chart should always begin at zero. Since zero is the main reference point, the zero line should be emphasized by making it slightly heavier than the other scale lines.

- Intervals should preferably be indicated in round numbers. e.g., 5's, 10's, 25's, 50's, etc. Odd numbers such as 3's, 7's, and 13's should be avoided.

- Data on the chart should generally be placed on the left of the zero line outside the grid. In the event of limited space, however, bar labels can be placed within each bar (leaving a shaded space around letters), or above the bars.

Pie Charts

Display Form

This graphic form uses various sectors of a circle to represent component parts of an aggregate or total. Each component part is proportional to the value it represents.

Advantages

The circle (or pie) is easily conceptualized as a whole, hence, division into a few large contrasting components is readily understood.

The popularity of this graphic form may facilitate receptivity to data.

Examples

Figures 30 through 33 illustrate alternative ways of displaying pie charts.

Cautionary Notes

The following cautions should be noted when considering the use of pie charts:

- Portraying more than four or five categories by means of pie charts makes it difficult to differentiate between the relative values portrayed.
- It is complicated and time consuming to divide part of a circle into representative proportions.
- There is some difficulty in comparing sectors of different sized circles. Since the size or area of a circle represents the quantity portrayed, it is extremely difficult to compare components of small and large variables when each variable is represented by an individual pie chart.

Flow Chart

Display Form

The flow chart uses a concept analogous to the movement of a river, stream or waterway which divides and reduces its flow, or combines with other flowing systems to increase its flow. The movement and distribution are depicted in a variety of ways--the complexity depending on the system being represented. Usually, the direction of flow is represented by arrows, and quantities are represented by varying the thickness of the flow lines. Different shading may be used to represent the flow of different items.

Advantages

With a well designed flow chart, it is possible to present a large number of facts and relationships simply, clearly, and accurately without resorting to extensive and involved verbal description.

The concept of flow enables easy association with process, movement, or distribution. This contributes to quick comprehension and long retention of the information displayed.

FIGURE 30

THE SIMPLE PIE CHART

This simple pie chart represents age distribution of enrollees in post-secondary vocational education.

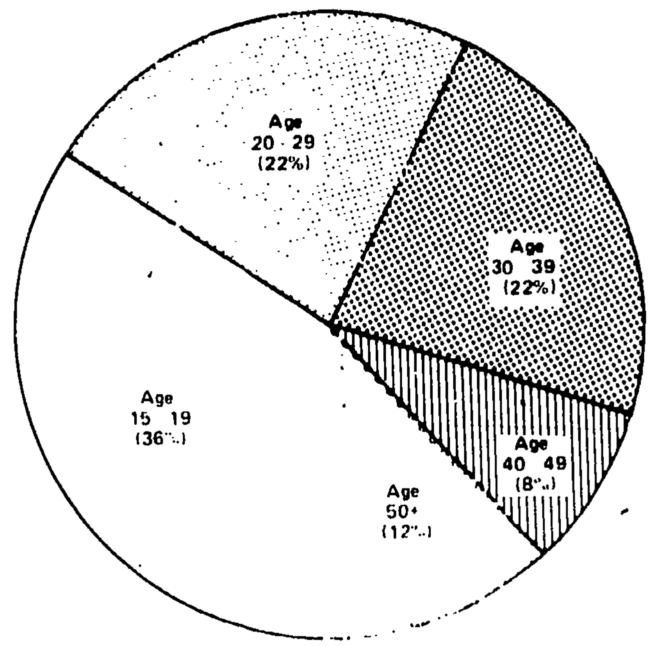


FIGURE 31

THE THREE DIMENSIONAL PIE CHART

This pie chart shows the age distribution of enrollees in post-secondary vocational education in three dimensional pie chart form. A removed segment of the pie is shown to emphasize the magnitude of enrollment in the 15-18 years age category.

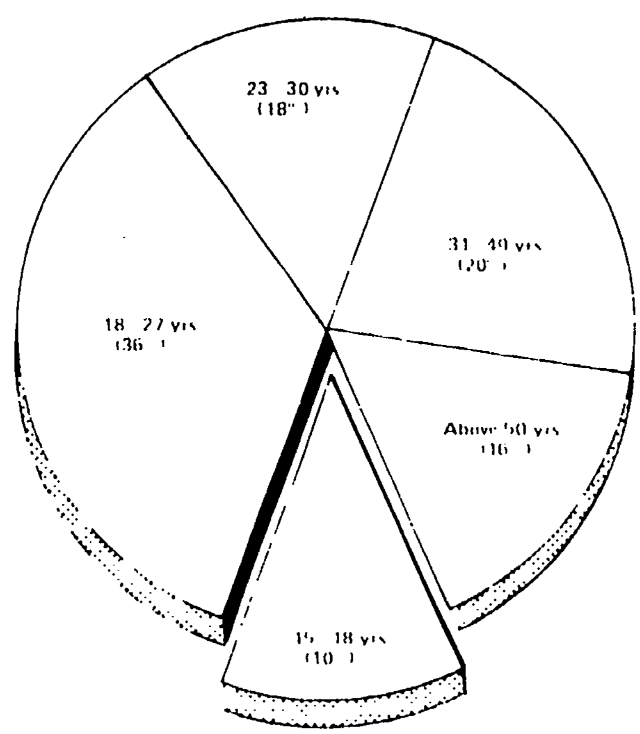


FIGURE 32

REMOVING A SECTION FOR EMPHASIS

Removing a section for emphasis is used to illustrate the number of vocational enrollees as a proportion of the total post-secondary enrollment for specific age groups.

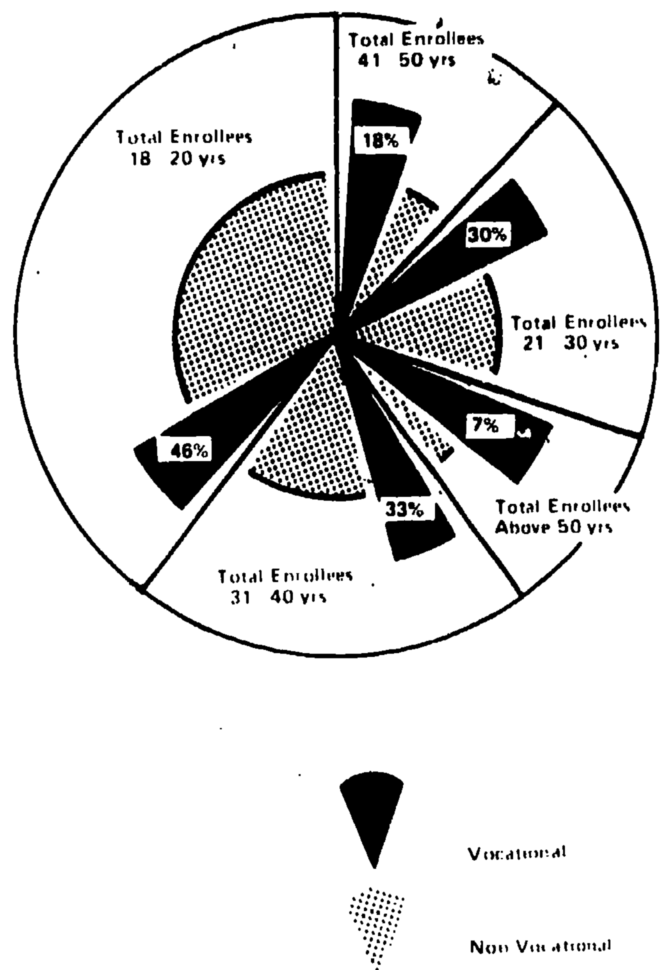
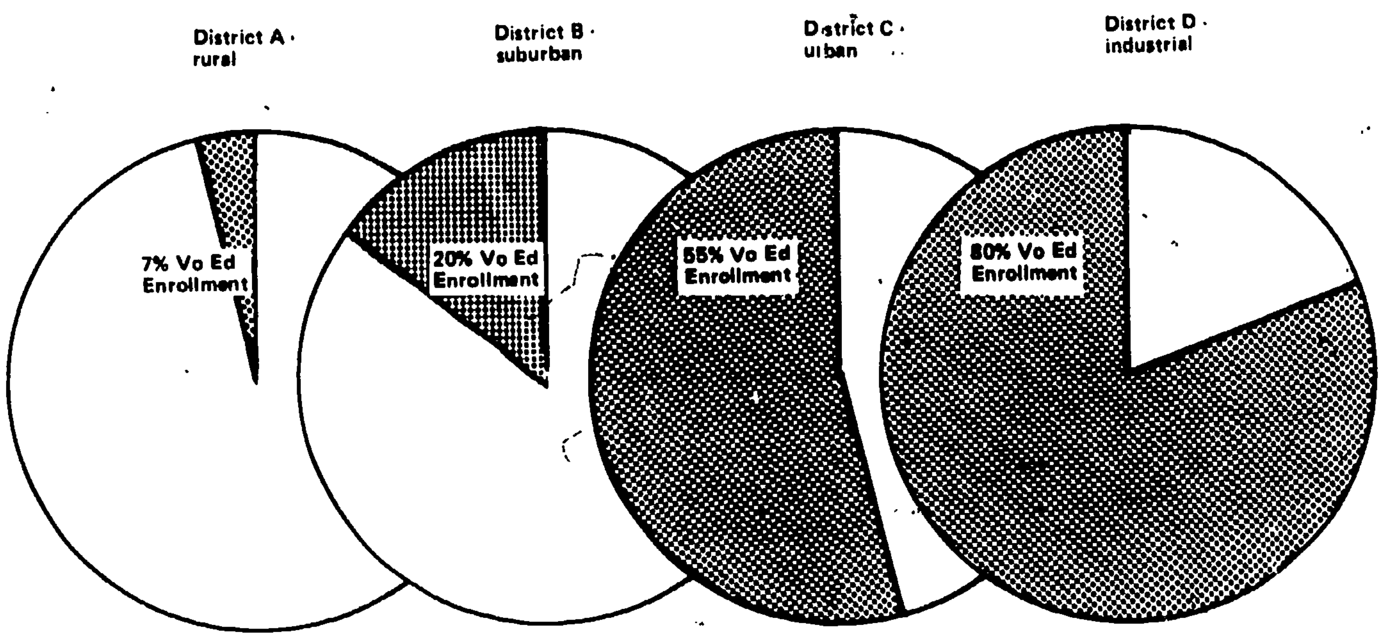


FIGURE 33

JUXTAPOSED PIE CHARTS

Four juxtaposed pie charts show a comparison of secondary vocational enrollment as a percentage of total enrollment in secondary schools in four district types. The four pie charts compare four different categories to emphasize the difference in vocational enrollments by district characteristic. It should be noted that the circles are of equal size because percentages are being used for comparison. Care should be taken not to display the absolute values of differing categories, since circles will have varying sizes making the magnitude of the shaded portions difficult to compare.



Uses

Flow charts are used to emphasize successive movements through a process from the starting point to the finish.

They are used to show:

- the various steps in a series of operations
- the processes or sequences involved in the planning, production, and distribution of some product
- the flow of income and expenditures as indicated by the sources of funds and the manner of disbursement

Examples

Figures 34 through 36 illustrate the uses of flow charts.

FIGURE 34

SIMPLE FLOW CHART SHOWING THE DISTRIBUTION OF FUNDS

Flow chart demonstrating the disbursement of funds for 10 required purposes. The hierarchical order of the statement of purposes can indicate state or federal priorities, or can reflect differences in the magnitude of funding. This same procedure can be used to illustrate the disbursement of total vocational education dollars into major categories, the allocation of funds among eligible recipients, or the flow of funds to geographic areas. Use of different shading patterns can also illustrate funding sources, and the allocation to each purpose or recipient from each source. Care should be taken to limit its use to data amenable to the use of the concepts of distribution and flow.

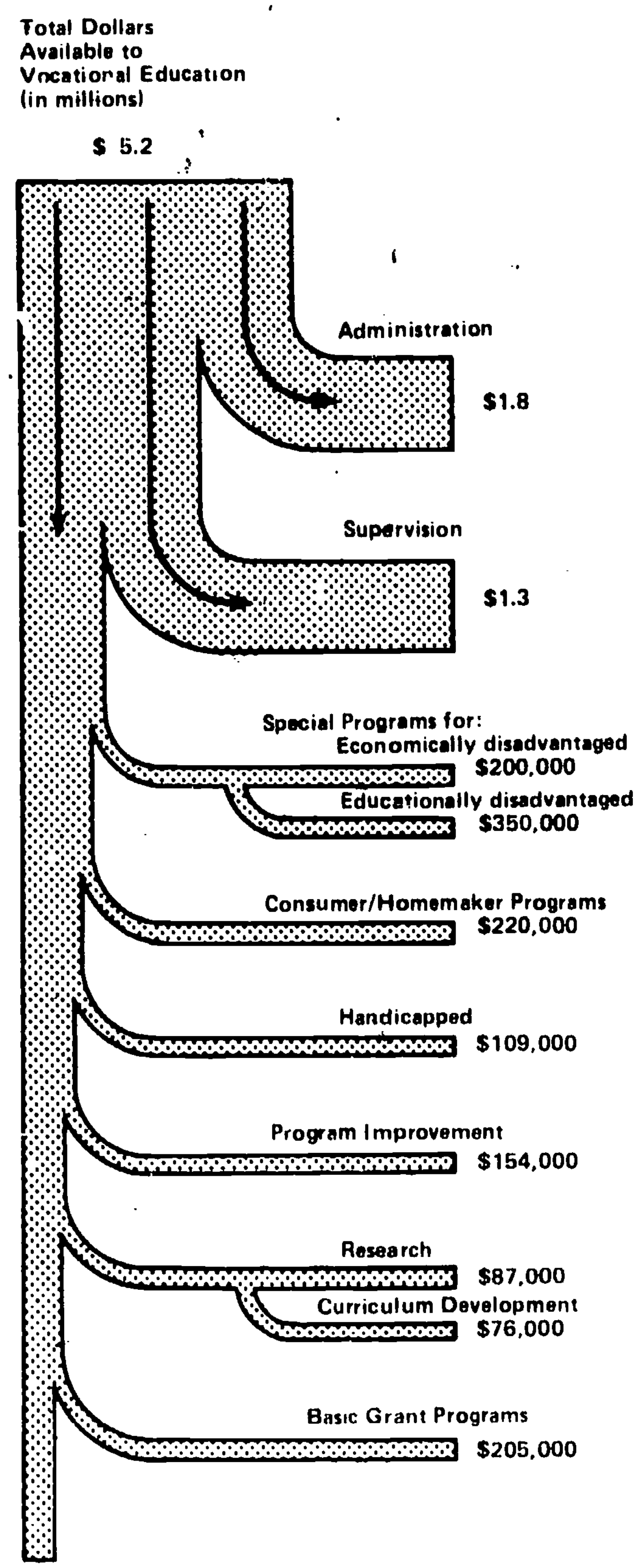


FIGURE 35

A FLOW CHART SIMPLIFIED BY SCALING TO UNITS OF A DOLLAR

Sometimes it is necessary to translate or convert large quantities of money into sums with which an audience can relate. A common practice is to convert allocations to parts of a dollar. The flow chart (one of many graphic forms used for this purpose) then shows, for every dollar spent, what proportion is allocated to each category. The relative cost of different activities becomes very obvious.

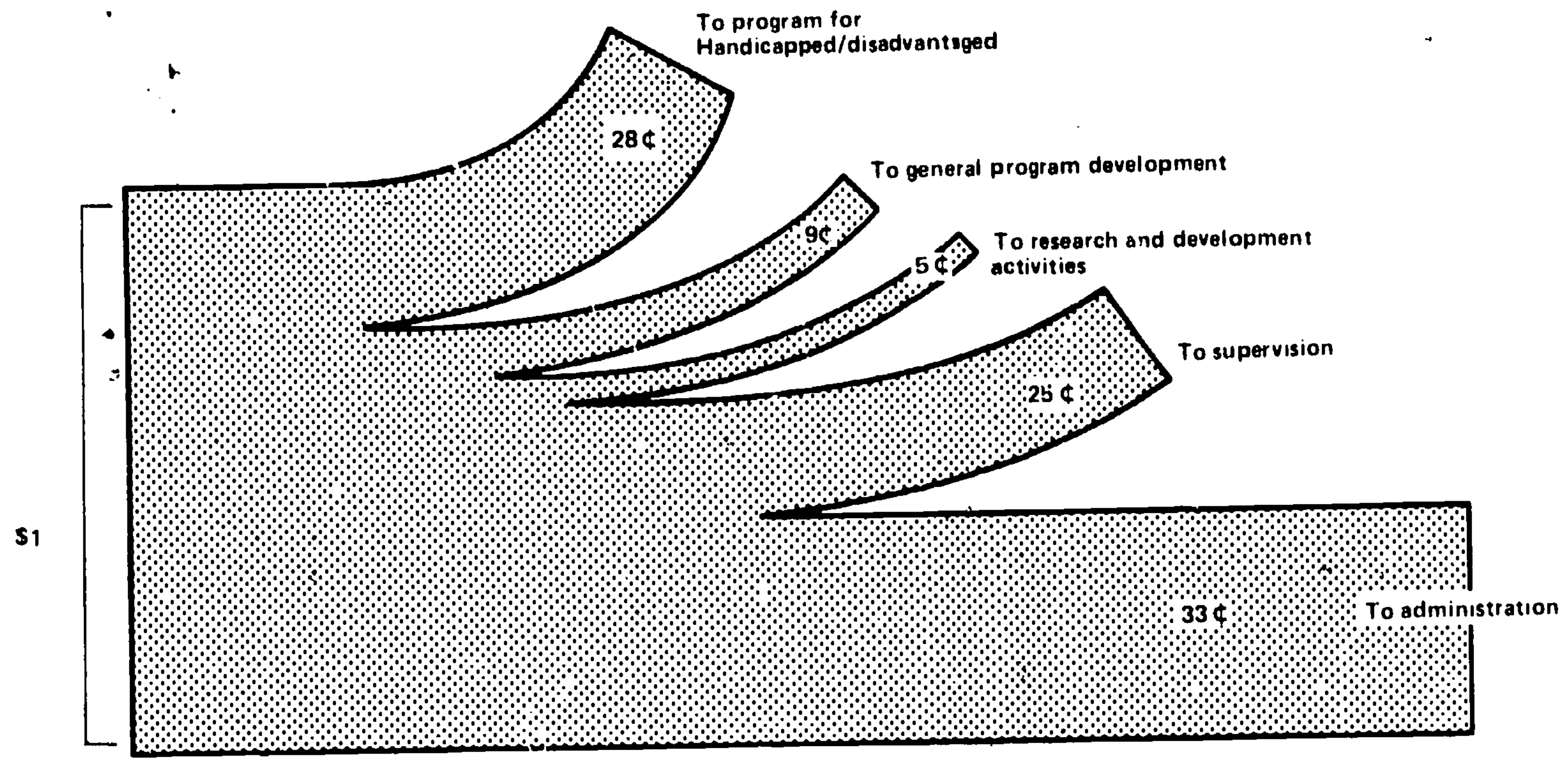
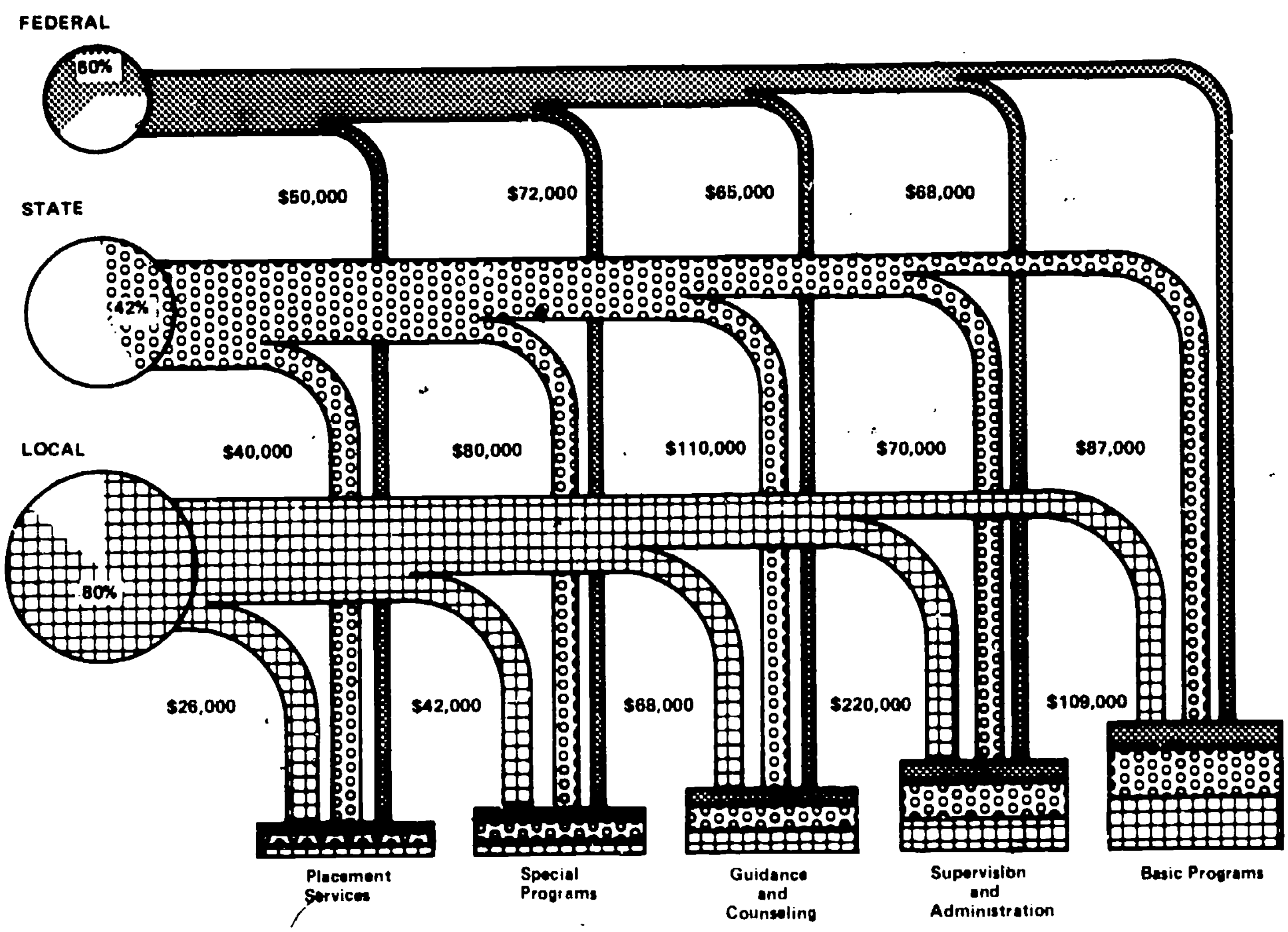


FIGURE 36

A COMPLEX FLOW CHART SHOWING THE DISTRIBUTION OF FUNDS TO VOCATIONAL EDUCATION PURPOSES

In a funding system with the complexity and diversity as that in vocational education, it may be necessary to emphasize sources as well as the categories or purposes to which funds are allocated. This can be accomplished by showing the flow of funds from each source across the purposes or categories to which they were distributed. With adequate graphic representation and proper labeling, such a flow chart can greatly facilitate the comprehension of complex funding systems. The diagram below illustrates the distribution of funds for five vocational education purposes.

Funding Sources:



Pictorial Displays

Display Form

There are many types of pictorial displays, all seeking to maximize the appeal of some graphic form through artistic expression. In some of these displays, pictorial symbols of varying sizes are used to represent the values displayed; in others, pictures or sketches are drawn to embellish or highlight aspects of the display. The most frequently used, and the most effective form of pictorial display, however, is the three dimensional representation achieved through projection techniques. Bar and column charts, pie charts, as well as trend graphs, are frequently enhanced through the depth and picturelike qualitites achieved by three dimensional representation. The examples presented in this section are limited to three dimensional projection, but depending on the purpose, other forms of pictorial display may be equally effective for communicating data.

Purpose

There are many advantages to pictorial displays. They are as follows:

- Pictorial displays have popular appeal.
- Pictorial displays are desirable for communicating to persons with a dislike for statistical charts, or to persons who have difficulty understanding other display forms.
- The facts portrayed in pictorial charts are said to be remembered longer than facts presented in tabular or non-pictorial forms.

Examples

Figure 37 through 39 illustrate pictorial displays.

FIGURE 37

THREE DIMENSIONAL LINE GRAPHS COMPARING ENROLLMENT AND PLACEMENT

This figure shows an illustration of the picture-like quality that can be achieved with the use of projection techniques to portray trends. To some audiences, this graphic representation may be more appealing and more meaningful than any two dimensional chart. There are many variations of this basic form.

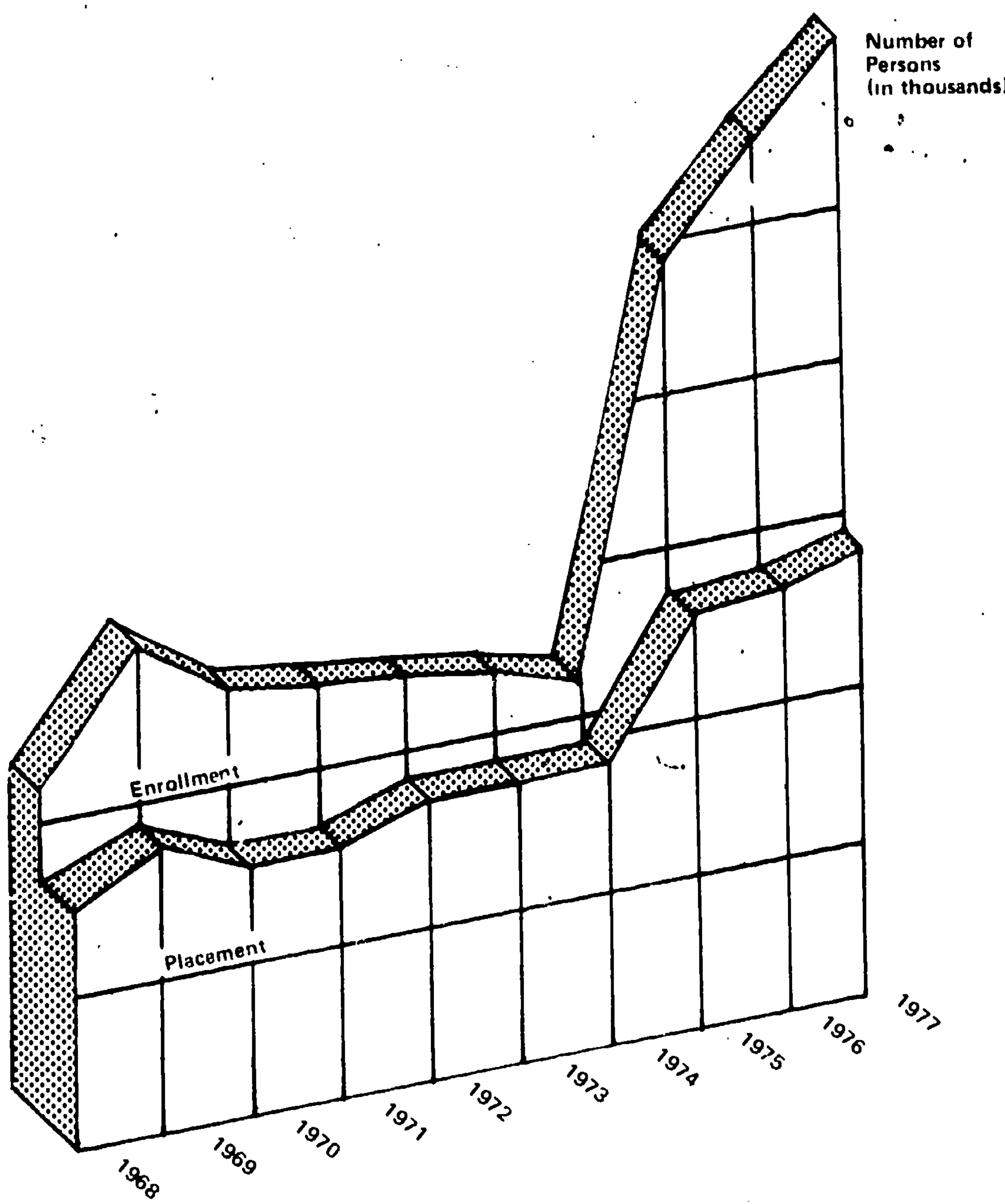
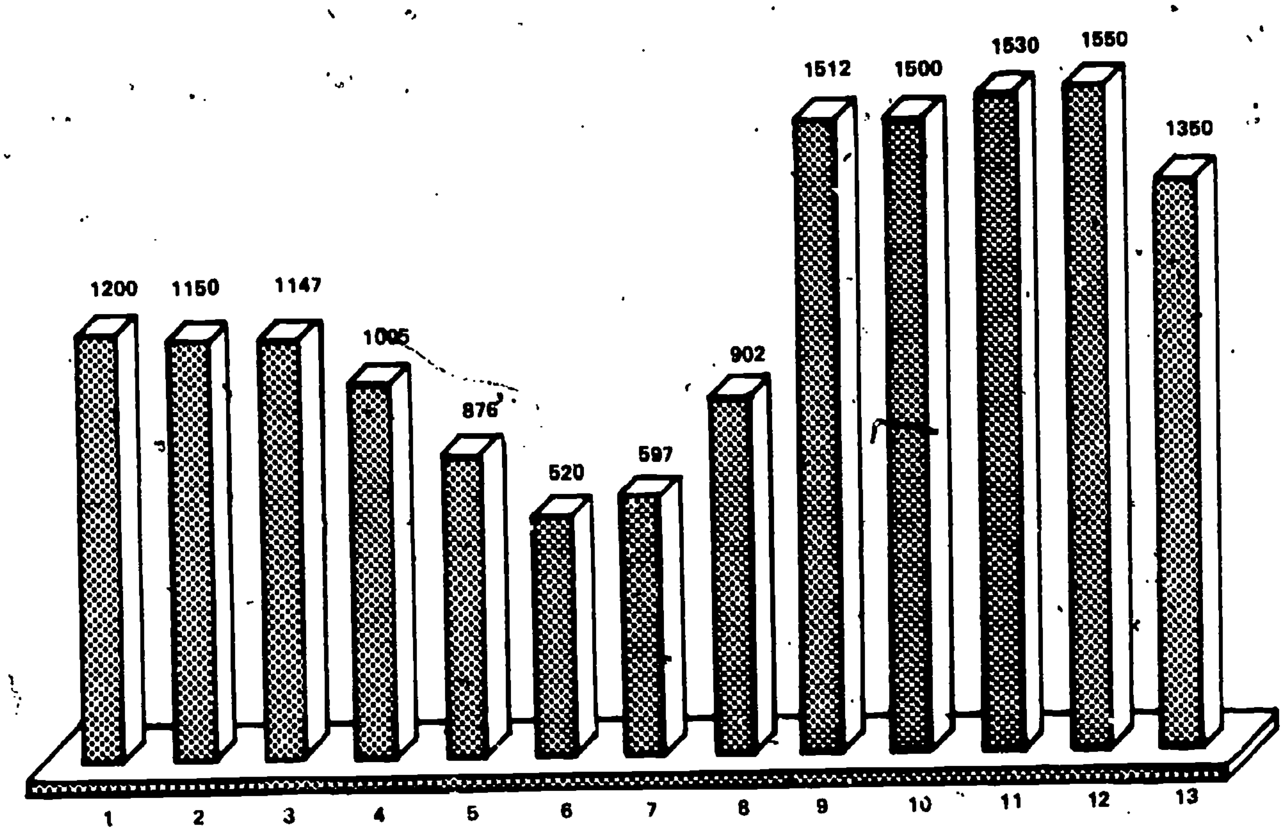


FIGURE 38

THREE DIMENSIONAL COLUMN DIAGRAM

This figure illustrates a three dimensional portrayal of the number of persons enrolled in various programs. The height of the column is proportional to the number of persons enrolled in the program represented by that column.



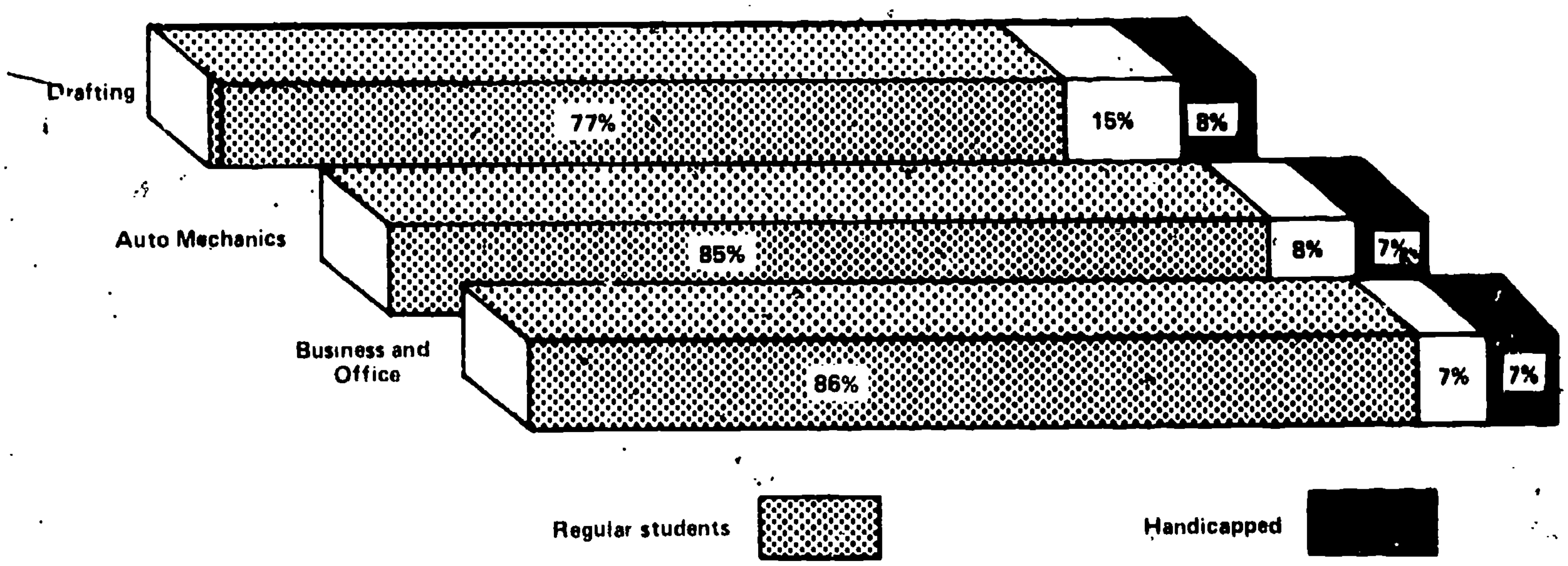
Vocational Program Code

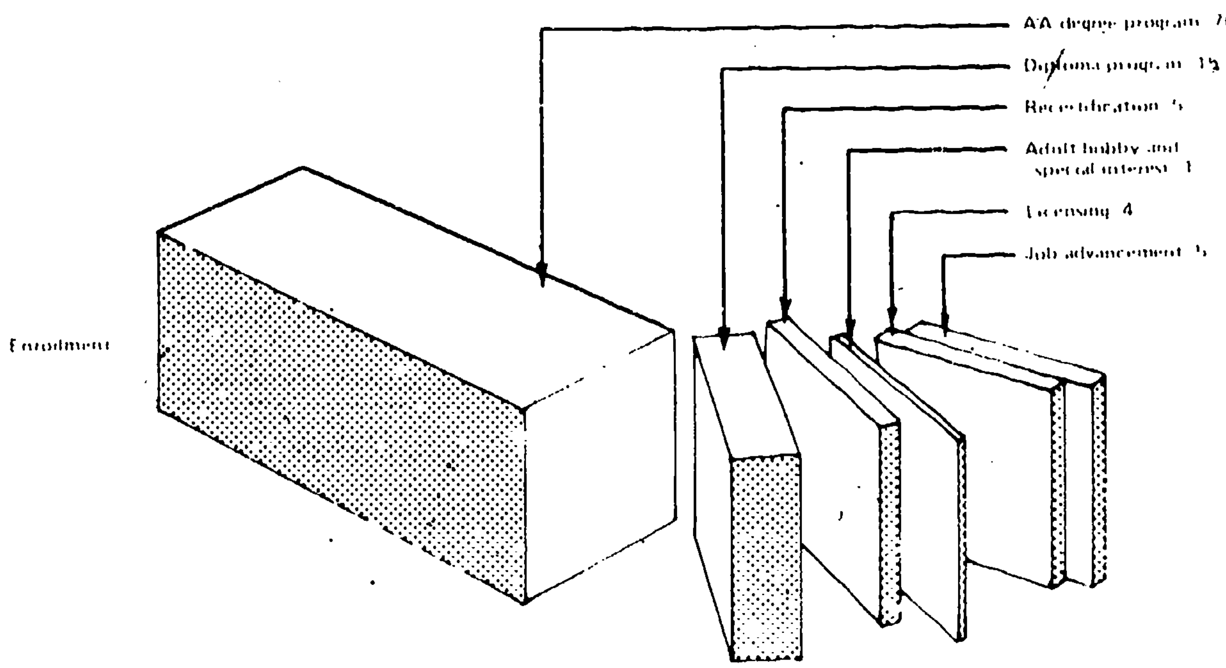
1 Plastics Technician
2 Horticulture Production
3 Livestock Management
4 Fashion Retailing
5 Insurance
6 Marketing
7 Accounting
8 Quantity Food Preparation
9 Auto-Mechanics
10 Practical Nursing
11 Data Processing(keypunch)
12 Cosmetology
13 Interior Design

FIGURE 39

THREE DIMENSIONAL BAR DIAGRAM

Bars can also be enhanced by three dimensional representation. The illustrations below show two ways of portraying division into various categories. The first uses differences in shading to represent different categories, and the other slices the bar into various sections. In each respective case, the shading or the sliced section represent the magnitude of the quantity portrayed.





Cautionary Notes

The following cautionary notes should be observed when preparing pictorial displays:

- The user should be familiar with the basic principles of projection techniques to avoid the construction of three dimensional charts which are distorted or misleading.

- Three dimensional representation is very time consuming. The user should carefully weigh the benefits of three dimensional displays with the conventionally drawn chart of the same type. The major criteria for evaluation are simplicity, authenticity, precision, appropriateness and appeal.

- When constructing three dimensional bar and column charts, it must be remembered that the front face shows the true size and shape representing the value portrayed.

Statistical Maps[1]

Display Form

A map is a representation of whole or part of an area on a flat surface. Usually, characteristics of the area are represented on the map with the use of symbols, shading, or quantified values. Statistical maps use these techniques to show and locate statistical information.

[1] Statistical maps are not illustrated in this manual. Persons desirous of using this display form should consult the references in data presentation listed in the bibliography.

Advantages

The use of maps as a graphic display technique is advantageous in many ways:

- Maps enable the audience to observe the geographical distribution of statistical information.

- Maps facilitate comparison among various characteristics in the geographic area. This is especially effective when overlays are used to superimpose varying characteristics on the geographic area represented.

- Maps represent the magnitude of a specific variable, while at the same time portrays its spatial distribution, increases the formative capacity of the data, and this facilitates the identification of problems and the uncovering of hidden information.

Summary

The importance of adequate data display cannot be overstated. It is the critical link between the analysis and interpretation of information, and the resulting actions undertaken by the recipients to whom interpreted information is presented. It is the task of the presenter to effectively communicate the desired information.

The major points noted were consideration of the audience, and awareness of the basic guidelines for data display--simplicity, clarity and effectiveness. The central purpose was "making the point" as effectively as possible. Effective display is realized with the appropriate use of row and column descriptions in the tabular form, or the appropriate use of points, lines, areas or other geometric forms for graphic displays. The display of information can then be tailored to accentuate, simplify, highlight, or exaggerate chosen aspects of data.

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APPENDIX A

A LIST OF INFORMATION ITEMS USEFUL FOR VOCATIONAL EDUCATION PLANNING RATED BY DEGREE OF IMPORTANCE

Appendix A contains information having varying degrees of usefulness in developing state plans for vocational education. The following procedure was used to generate the information found in Appendix A.

A set of planning questions (e.g., where are we? where are we going?) was identified which typically are addressed in a comprehensive plan. Then, a set of planning tasks (e.g., describe the context for planning) and associated subtasks (e.g., define the context for employment of the vocational output) where identified which operationalize the planning questions. The planning questions, planning tasks, and planning subtasks provided a rational framework for selecting from a variety of sources the information found in Appendix A. The framework and the information items comprise the left hand side of each page in Appendix A.

Three state and three local level vocational educators were asked to judge the importance of each item of information for carrying out the planning subtask to which the information item was assigned. The instruction given these six persons was to judge the perceived importance of each information item even if the information was not currently used by the individual in state plan development. The results of the ratings of importance are found on the right side of each page in Appendix A. A check ✓ in a column indicates that there was consensus among the state or local persons about the level of importance of the information item. If there is no ✓ for an information item, it indicates that no consensus existed within either of the two groups; rather, there was a range of opinion as to the importance of the item of information.

PLANNING TASK: Describe Context for Planning

PLANNING SUBTASK(S):

(1) Define context for employment of vocational output.

	Level of Importance: Highly Important – State	Highly Important – Local	Important – State	Important – Local	No Consensus – State	No Consensus – Local
. descriptions of the population	✓	✓				
. descriptions of the workforce	✓					✓
. description of migration patterns of the population, the workforce, and business and industry both within the state and out of the state	✓					✓
. analyses of potential impact on employment caused by migrations of populations and business/industries			✓			✓
. description of areas of the state experiencing, or likely to experience, instability or large changes in needs for trained workers			✓	✓		
. descriptions of locations and concentrations of industries/businesses		✓	✓			
. descriptions of trends in wage rates, hours, and other working conditions by industry and occupation				✓	✓	
. analyses of hiring practices of employers				✓	✓	
. trends in unemployment for specific age groups and target populations			✓	✓		
. descriptions of commuting patterns of workers	✓			✓		

PLANNING TASK: Describe Context for Planning

PLANNING SUBTASK(S):

(2) Assess needs of employers for trained workers.

	Level of Importance: Highly Important – State	Highly Important – Local	Important – State	Important – Local	No Consensus – State	No Consensus – Local
. estimates of demand for new workers by occupation	✓	✓				
. estimates of supply available to meet demand	✓	✓				
. descriptions of sources of supply	✓			✓		
. descriptions of occupations which are new or emerging in different parts of the state or region of the country		✓	✓			
. description of growth and decline patterns in the mix of occupations or industries		✓	✓			
. description of occupations manifesting chronic shortages of labor	✓	✓				
. description of occupations manifesting stable levels of employment, and those which manifest growth and decline in demand for trained workers	✓	✓				
. demands by employers for vocational education to provide training for their employees	✓	✓				
. description of job openings in industries which are new to different parts of the state			✓	✓		

PLANNING TASK: Describe Context for Planning

PLANNING SUBTASK(S):

(3) Assess needs of people for job skills.

	Level of Importance: Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
. description of areas of persistent or cyclically high levels of unemployment		✓	✓			
. description of areas with high levels of social disorganization				✓	✓	
. description of characteristics of chronically unemployed		✓			✓	
. description of economically distressed areas and pockets of poverty	✓			✓		
. description of competencies required for job success in selected occupations or clusters		✓			✓	
. description of skills which are transferable across occupations	✓	✓				
. description of trends in requests by employers and employees for job-training services	✓	✓				
. description of expressed needs for vocational education by underemployed and unemployed persons		✓	✓			

PLANNING TASK: Describe Context for Planning

PLANNING SUBTASK(S):

(4) <u>Assess system capacity to meet needs of employers and potential students.</u>

	Level of Importance: Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
• descriptions of facilities available for vocational education	✓	✓				
• descriptions of facilities used for but not suitable for vocational education purposes			✓	✓		
• descriptions of persons credentialed and available to teach, administer, or supervise vocational education by areas for which credentialed	✓	✓				
• descriptions of equipment being used for vocational education instruction		✓			✓	
• descriptions of instructional programs		✓			✓	
• descriptions of future enrollment at the secondary, post-secondary and adult levels	✓	✓				
• descriptions of current and anticipated needs for • teachers/administrators • facilities • instructional programs	✓	✓				
• descriptions of employment objectives for each instructional program		✓			✓	
• descriptions of performance objectives for each instructional program		✓			✓	
• descriptions of completions, availables for placements, and placements for all instructional programs	✓	✓				

PLANNING TASK: Describe Context for Planning

PLANNING SUBTASK(S):

(4) Continued

	Level of Importance					
	Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
. descriptions of support or ancillary services	✓	✓				
. descriptions of non-public school facilities eligible for providing vocational education under contract					✓	✓
. descriptions of non-public school facilities being used for vocational education under contract with LEAs					✓	✓
. descriptions of public school vocational education students served in non-public school facilities					✓	✓
. descriptions of private sector involvement in vocational education instruction			✓	✓		

PLANNING QUESTION: Where Are We Going?

PLANNING TASK: Formulate Goals and Objectives

PLANNING SUBTASK(S):

	Level of Importance: Highly Important — State	Highly Important — Local	Important — State	Important — Local	No Consensus — State	No Consensus — Local
(1) Analyze and interpret context information; compare context information with needs of clients, system capacity and available resources; check feasibility of intended objectives with institutional and professional philosophy, organizational and departmental politics, and critical avenues for coordination and support.						
Note: The information elements pertinent to the above subtask are dispersed throughout the many planning tasks in the appendix. In the formulation of goals and objectives, other planning functions and planning tasks must be considered. These include identifying resources, checking system capacity and determining the need of various recipient groups. As a result, the information item pertinent to the formulation of goals and objectives are similar to the items associated with other functions and tasks.						

PLANNING TASK: Allocate Resources

PLANNING SUBTASK(S):

(1) Determine resource availability and requirements.

	Level of Importance: Highly Important — State	Highly Important — Local	Important — State	Important — Local	No Consensus — State	No Consensus — Local
• description of gross dollars currently available for vocational education by source of dollars	✓	✓				
• description of gross dollars estimated as likely to be available for vocational education, by source, during each year of the plan	✓	✓				
• description of current funding for vocational education to LEAs and other eligible recipients	✓					✓
• description of funding required to maintain present level of programming for each year of the plan (adjusted for inflation)	✓	✓				
• description of funding required to expand the present level of programming or to achieve different mixes of programming for each year of the plan (adjusted for inflation)	✓	✓				
• description of current and anticipated funding required to expand programming as evidenced from the aggregation of all local applications for funds (adjusting for inflation)	✓	✓				

PLANNING TASK: Allocate Resources

PLANNING SUBTASK(S):

(2) <u>Determine priority of applicants.</u>

	Level of Importance					
	Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
. description and listing of applicants for funds who are from economically distressed areas and pockets of poverty	✓					✓
. description and listing of applicants for funds who are from areas of persistent or cyclically high levels of unemployment	✓					✓
. description and listing of applicants for funds who are in areas with high levels of social disorganization					✓	✓
. description and listing of applicants who propose programs which are new to the area to be served and which are designed to meet new and emerging employment needs and/or job opportunities in the area, state, or nation	✓	✓				

PLANNING TASK: Allocate Resources

PLANNING SUBTASK(S):

(3) Distribute funds in accordance with priorities, available resources, and in compliance with set aside and matching provisions under the Amendments.

	Level of Importance: Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
• the relative standing of each eligible applicant for funds based on a formula which considers:	✓			✓		
• descriptions of the relative financial ability of LEAs to provide the resources necessary to meet the need for vocational education in the area they service						
• descriptions of the relative number or concentration of low-income families or individuals within the LEAs with approved applications						
• descriptions of the relative number or concentration of students whom they serve whose education imposes higher than average costs						
• descriptions of other factors facilitating the equitable distribution of funds						

	Level of Importance: Highly Important — State	Highly Important — Local	Important — State	Important — Local	No Consensus — State	No Consensus — Local
PLANNING TASK: Monitor Achievement of Objectives (targets)						
PLANNING SUBTASK(S):						
(1) <u>Measure discrepancies during each year of plan.</u>		/				
PLANNING TASK: Evaluate Plan						
PLANNING SUBTASK(S):						
(1) <u>Define effectiveness and efficiency of plan to meet needs of employers, students, and society.</u>						
. a description of program effectiveness measures and the relative standing of LEAs and other eligible recipients on these measures				✓	✓	
. a description of program efficiency measures and the relative standing of LEAs and other eligible recipients on these measures				✓	✓	
. a description of comparative placement, retention, and advancement in employment of persons receiving vocational education and other forms of training for employment		✓			✓	
: a description of comparative placement, retention, and advancement in employment of various cohort groups receiving vocational education and not receiving vocational education at the secondary level		✓	✓			

PLANNING TASK: Evaluate Plan

PLANNING SUBTASK(S):

(2) Assess outcomes and benefits of vocational education to employers, students, and society.

	Level of Importance: Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
description of the costs of vocational education and the returns to individuals (e.g., wages) and society (e.g., taxes)		✓			✓	
description of the relative costs of vocational education and other training programs for comparable groups of trainees		✓			✓	
same as above, but comparing returns to individuals in terms of wages, and to society in terms of taxes				✓	✓	
description of extent to which former trainees are no longer dependent on public assistance as a result of vocational education			✓	✓		
a description of the extent to which vocational education has reduced unemployment in economically distressed areas	✓	✓				
a description of the extent to which vocational education has met employers' needs for trained workers in new and emerging occupations	✓	✓				
a description of the extent to which vocational education has performed the task of creation					✓	✓
a description of how vocational education in a framework of life-long learning has enabled persons to advance along career ladders or enter new occupations				✓	✓	

PLANNING TASK: Evaluate Plan

PLANNING SUBTASK(S):

(2) Continued

	Level of Importance: Highly Important		Important		No Consensus	
	State	Local	State	Local	State	Local
. a description of student satisfaction with the training program and employment, and employer satisfaction with students' performance	✓	✓				
. tenure of graduate in places of employment				✓	✓	
. the geographic and occupational mobility of graduates					✓	✓

APPENDIX B

EDUCATIONAL, ECONOMIC, DEMOGRAPHIC, AND EMPLOYMENT DATA ELEMENTS USEFUL FOR PRODUCING PLANNING INFORMATION

Economic and Employment Data

(Information to be broken down by geographic area as applicable e.g., school district, political boundaries ...)

Residential construction permits

Rate and nature of industrial migration

New business incorporations

Current and projected dollar value of taxable property

Millage

Prevailing wages (by industry and occupation)

Assessed valuation

Changes in total taxable property for selected years

Revenue from property taxes for school purposes

Dollars invested in non-school construction

Tax base trends

Labor force participation rates

Unemployment

Educational Data

(By region, level, instructional program, type of institution, FTE, and headcount, as applicable)

Current and projected budget needs for instruction

Current and projected availability of funds for instruction

Cost to equip specific programs

Cost to build specific facilities

Instructional cost per enrollment

Instructional cost per FTE

Cost per completion

Cost per leaver

Cost per employed related occupation

Grants-in-aid for program support

Current capital improvements budget

Projected capital improvements budget

Bonded indebtedness at the school system

Entry to completion ratios in vocational education teacher training institutions

Extent to which graduates of vocational education teacher training institutions seek initial employment in the state

Current demand for vocational education teachers by specialty area

Enrollments in vocational education teacher training programs by areas for which they are majoring

Teacher turnover rates by field of instruction

Current and anticipated number of teachers requiring additional work experience or academic credit for credentialing purposes by year required

Enrollment in vocational education clubs

Inventory of institutions providing short-term post-secondary and adult training and upgrading

Student-teacher ratios

Inventory of substandard facilities

Inventory of supportive services to students and numbers and characteristics of students served by these services

Measures and extent of employer satisfaction with program completers

Measures and extent of student satisfaction with vocational education programs

Number of persons requesting vocational education

Number of persons turned away from vocational education because of lack of space in programs

Dollars requested to implement new programs

Dollars requested to maintain existing programs

Dollars requested to expand existing programs

Dollars requested for administration and supervision

Excess costs of providing services to special populations

Program costs per contact hour

Tuition income

Expenditures data by purpose and activities

Current enrollments by sex, by special needs categories

Projected enrollments by sex, by special needs categories

Leavers by sex, by special needs categories

Completers by sex, by special needs categories

Placement rates by sex, by special needs categories

Current total enrollments for all programs, vocational and non-vocational

Projected total enrollments for all programs, vocational and non-vocational

Current enrollment capacity

Projected enrollment capacity

Current training station utilization

Listing of programs by whether existing, new, expanding or to be dropped

Programs by type (e.g., special, regular, coop)

Programs awaiting implementation because of lack of facilities, equipment, and/or staff

Demographic Data

LEAs and other institutions with high concentrations of special needs students

Unemployed but employable physically handicapped persons

Unemployed but employable mentally handicapped persons

Population by race, sex, age, income category, education attainment

Estimates of persons with limited English-speaking ability

Population density

Correctional population

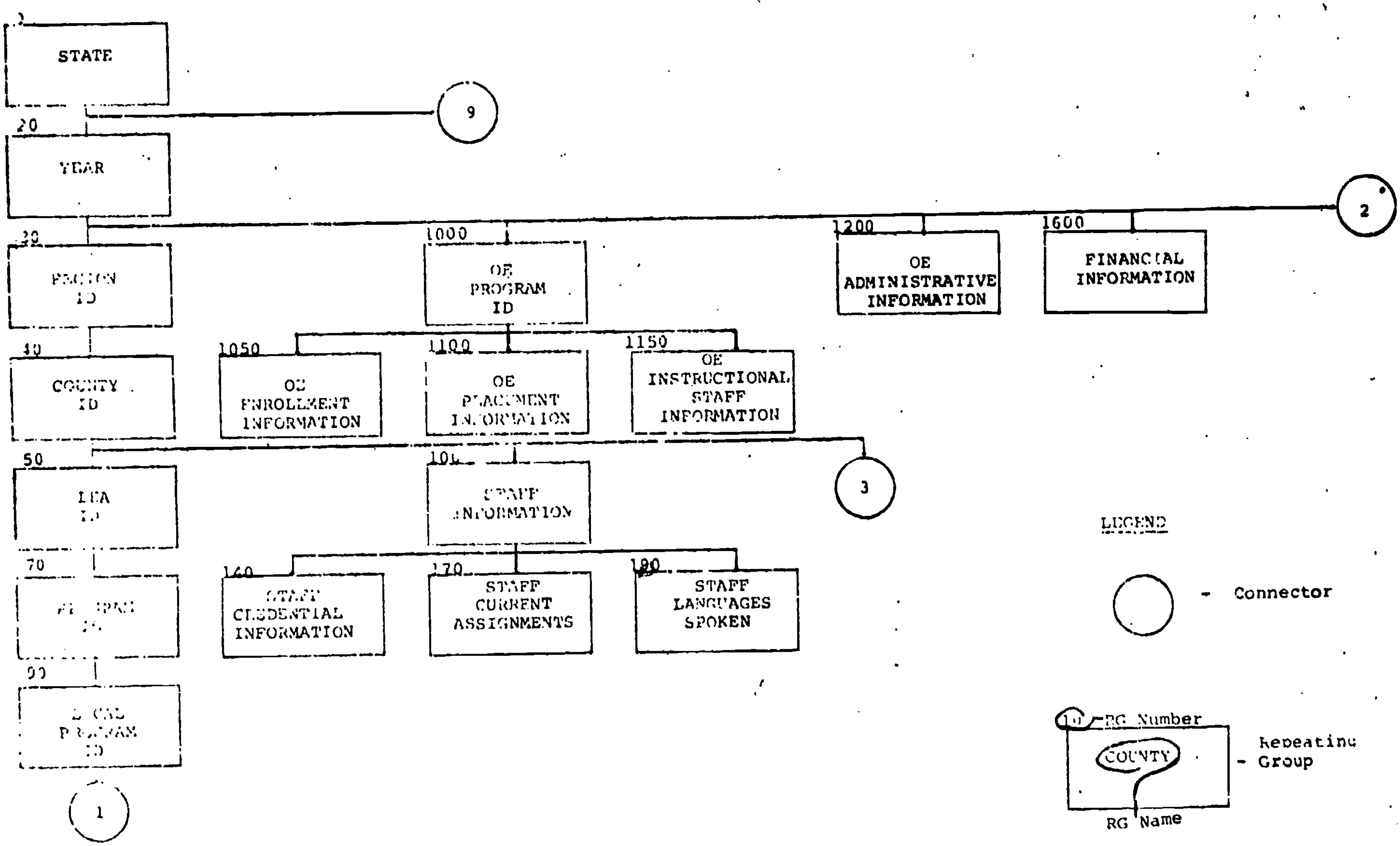
Retirees seeking part time employment

Regions with large current ratios of handicapped and disadvantaged populations

Population migration trends

APPENDIX C

MISVE DATA BASE DIAGRAM AND DEFINITION



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9
20
YEAR
2
1000
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1200
OE ADMINISTRATIVE INFORMATION
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FINANCIAL INFORMATION
40
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OE ENROLLMENT INFORMATION
1100
OE PLACEMENT INFORMATION
1150
OE INSTRUCTIONAL STAFF INFORMATION
50
3
STAFF INFORMATION
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180
STAFF LANGUAGES SPOKEN
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LEGEND
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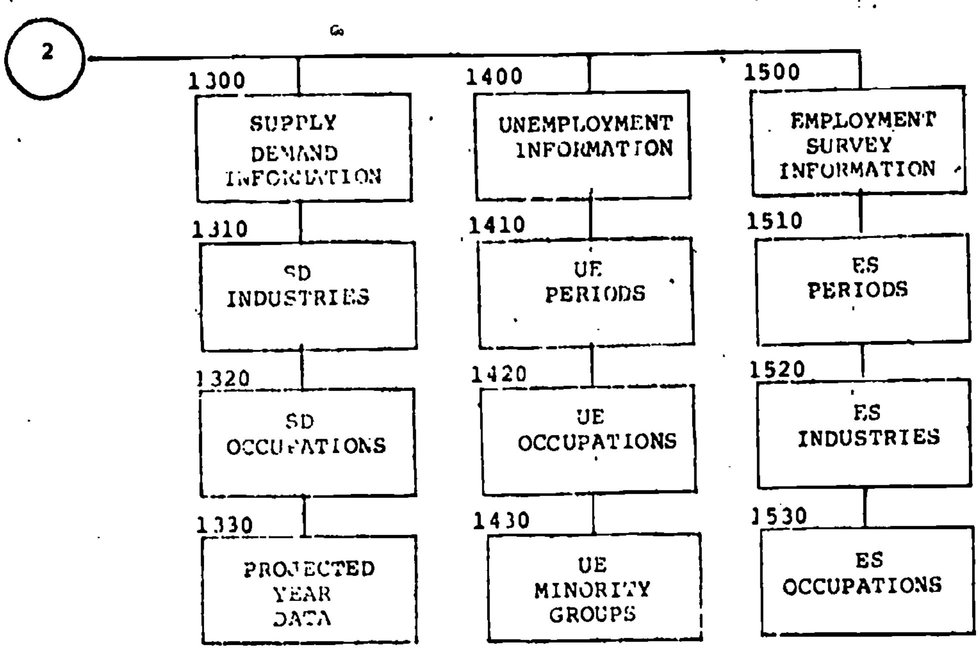
RG Number
COUNTY
RG Name


2
1300
SUPPLY DEMAND INFORMATION
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SD INDUSTRIES
1320
SD OCCUPATIONS
1330
PROJECTED YEAR DATA
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UNEMPLOYMENT INFORMATION
1410
UE PERIODS
1420
UE OCCUPATIONS
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UE MINORITY GROUPS
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EMPLOYMENT SURVEY INFORMATION
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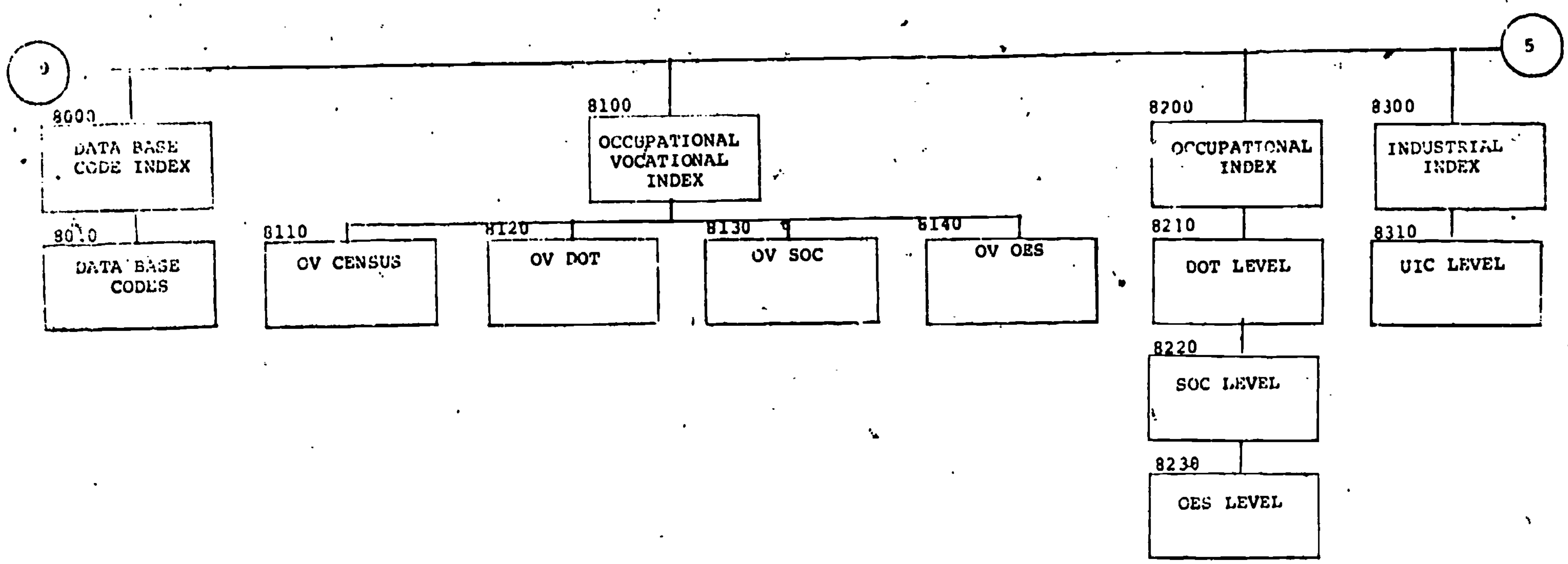
ES PERIODS
1520
ES INDUSTRIES
1530
ES OCCUPATIONS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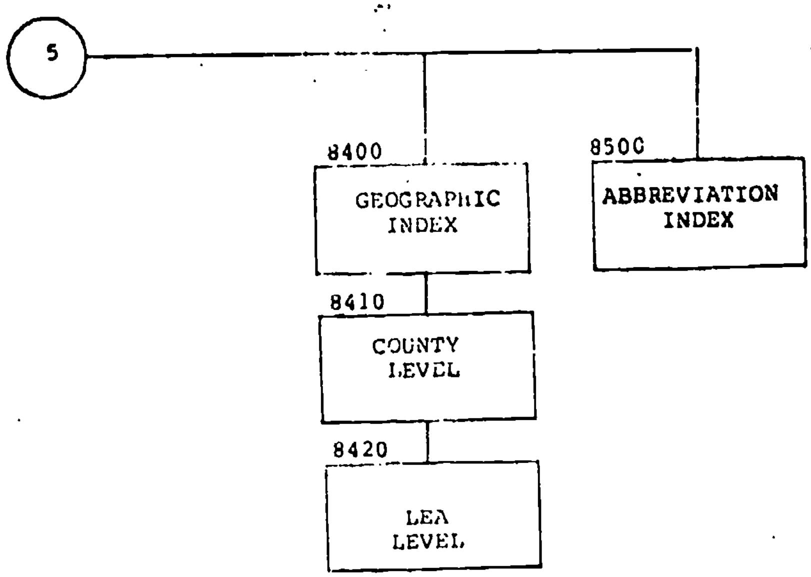
8010
DATA BASE CODES
8100
OCCUPATIONAL VOCATIONAL INDEX
8110
OV CENSUS
8120
OV DOT
8130
OV SOC
8140
OV OES
8200
OCCUPATIONAL INDEX
8210
DOT LEVEL
8220
SOC LEVEL
8230
OES LEVEL
8300
INDUSTRIAL INDEX
8310
UIC LEVEL
5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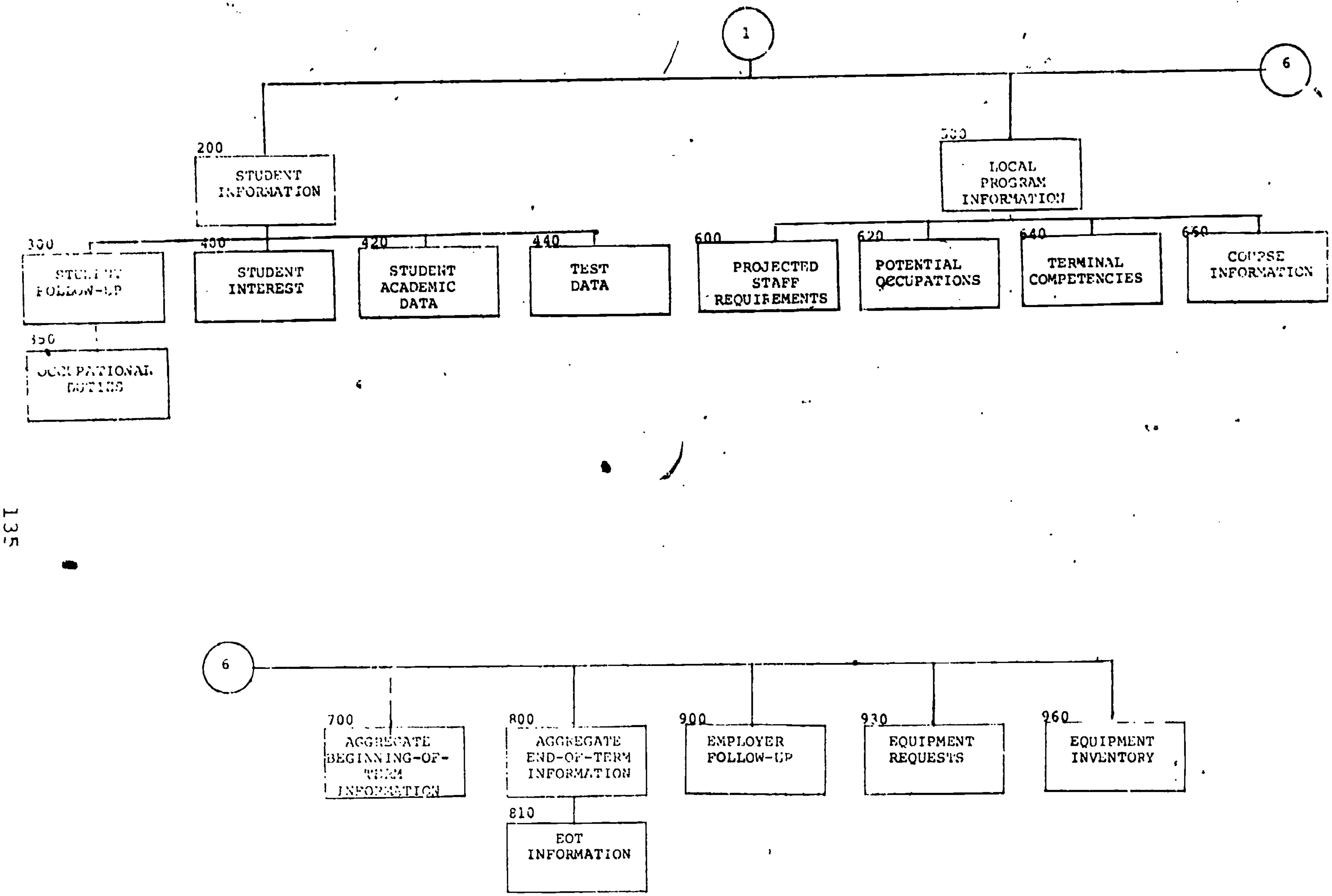
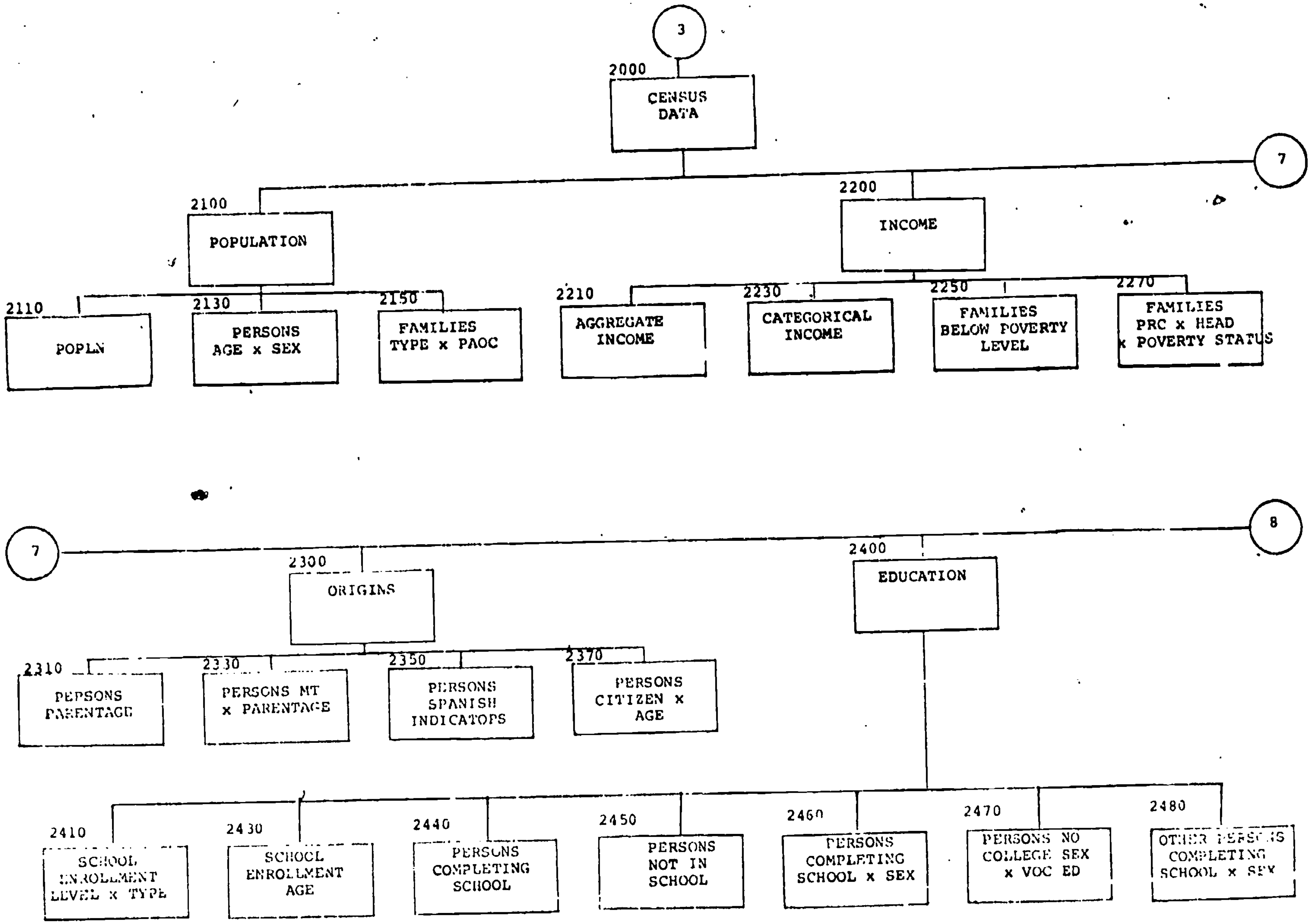
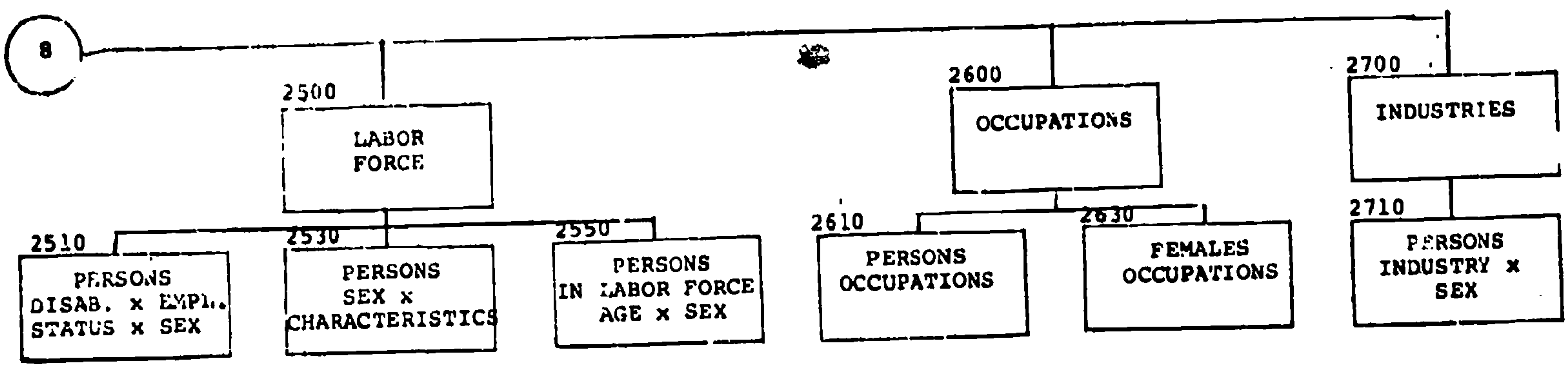
GEOGRAPHIC INDEX
8500
ABBREVIATION INDEX
8410
COUNTY LEVEL
8420
LEA LEVEL


1
6
200
STUDENT INFORMATION
LOCAL PROGRAM INFORMATION
400
STUDENT INTEREST
420
STUDENT ACADEMIC DATA
440
TEST DATA
600
PROJECTED STAFF REQUIREMENTS
620
POTENTIAL OCCUPATIONS
640
TERMINAL COMPETENCIES
660
COURSE INFORMATION
6
700
AGGREGATE BEGINNING-OF-TERM INFORMATION
800
AGGREGATE END-OF-TERM INFORMATION
810
EOT INFORMATION
900
EMPLOYER FOLLOW-UP
930
EQUIPMENT REQUESTS
960
EQUIPMENT INVENTORY


3
2000
CENSUS DATA
7
2100
POPULATION
2200
INCOME
2110
POPLN
2130
PERSONS AGE x SEX
2150
FAMILIES TYPE x PAOC
2210
AGGREGATE INCOME
2230
CATEGORICAL INCOME
2250
FAMILIES BELOW POVERTY LEVEL
2270
FAMILIES PRC x HEAD x POVERTY STATUS
7
8
2300
ORIGINS
2400
EDUCATION
2310
PERSONS PARENTAGE
2330
PERSONS MT x PARENTAGE
2350
PERSONS SPANISH INDICATORS
2370
PERSONS CITIZEN x AGE
2410
SCHOOL ENROLLMENT LEVEL x TYPE
2430
SCHOOL ENROLLMENT AGE
2440
PERSONS COMPLETING SCHOOL
2450
PERSONS NOT IN SCHOOL
2460
PERSONS COMPLETING SCHOOL x SEX
2470
PERSONS NO COLLEGE SEX x VOC ED
2480
OTHER PERSONS COMPLETING SCHOOL x SEX


8
2500
LABOR FORCE
2600
OCCUPATIONS
2700
INDUSTRIES
2510
PERSONS DISAB. x EMPL. STATUS x SEX
2530
PERSONS SEX x CHARACTERISTICS
2550
PERSONS IN LABOR FORCE AGE x SEX
2610
PERSONS OCCUPATIONS
2630
FEMALES OCCUPATIONS
2710
PERSONS INDUSTRY x SEX

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1* STATE (NAME XX):
20* CURRENT YEAR (RG):
  21* CY (NON-KEY NAME XX IN 20):
  30* REGION ID (RG IN 20):
    31* REGION (NON-KEY NAME X(20) IN 30):
    32* REGION CODE (NAME X(15) IN 30):
    40* COUNTY ID (RG IN 30):
      41* COUNTY (NON-KEY NAME X(20) IN 40):
      42* COUNTY CODE (NAME X(15) IN 40):
      50* LEA ID (RG IN 40):
        51* LEA (NON-KEY NAME X(20) IN 50):
        52* DIST CODE (NAME X(15) IN 50):
        53* LEA CODE (NAME X(15) IN 50):
        54* CONG DIST (NAME X(3) IN 50):
        70* PROGRAM ID (RG IN 50):
        71* PGM (NON-KEY NAME X(30) IN 70):
        72* PRG CODE (NAME X(10) IN 70):
        73* FIELD (NON-KEY NAME X(20) IN 70):
        74* FIELD CODE (NAME X(2) IN 70):
        90* LOCAL PGM ID (RG IN 70):
          91* LOCAL PGM (NON-KEY NAME X(30) IN 90):
          92* LOCAL PGM CODE (NAME X(10) IN 90):
          93* LOCAL PGM TYPE (NON-KEY NAME XX IN 90):
          94* SCHOOL (NON-KEY NAME X(20) IN 90):
          95* BLDG CODE (NAME X(5) IN 90):
          96* LEVEL (NAME X IN 90):
          3916* KONTROL NODE J (RG IN 90):
          3917* DUMMY J (NON-KEY NAME X IN 3916):
          200* STUDENT INFORMATION (RG IN 3916):
          201* ST LAST NAME (NAME X(15) IN (200):
          202* ST FIRST NAME (NAME X(15) IN 200):
          203* ST MI (NAME X IN 200):
          204* ST SSN (NAME X(11) IN 200):
          205* ST ID (NAME X(10) IN 200):
          206* ST ADDRESS (NON-KEY NAME X(20) IN 200):
          207* ST CITY (NON-KEY NAME X(10) IN 200):
          208* ST STATE (NON-KEY NAME X(2) IN 200):
          209* ST ZIP (NON-KEY NAME X(5) IN 200):
          211* ST PHONE (NON-KEY NAME X(12) IN 200):
          212* ST PARENT NAME (NON-KEY NAME X(25) IN
                 200):
          213* ST GRADE (NON-KEY NAME X(2) IN 200):
          214* ST AGE (NON-KEY NAME X(2) IN 200):
          215* ST BIRTHDAY (NON-KEY DATE IN 200):
          216* ST SEX (NON-KEY NAME X IN 200):
          217* ST ETHNIC GROUP (NON-KEY NAME X(5) IN 200:
          218* ST EDUC GROUP (NON-KEY NAME X(5) IN 200):
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219* ST PGM OBJ (NON-KEY NAME X(5)  IN 200):
221* ST EDUC OBJ (NON-KEY NAME X(5) IN 200):
222* ST MEMBER ST ORG (NON-KEY NAME X IN 200):
223* ST PGM STATUS (NON-KEY NAME X(5) IN 200):
224* ST EMPL STATUS BY SCHL (NON-KEY NAME X(5) IN 200):
225* ST LTD ENGLISH (NON-KEY NAME X IN 200):
226* ST NATIVE LANG (NON-KEY NAME X(10) IN 200):
234* ST SPEC NEEDS SERV (NON-KEY NAME X IN 200):
235* ST TYPE INST SETTING (NON-KEY NAME X(5) IN 200):
246* ST RESERVED 1 (NON-KEY NAME X(10) IN 200):
247* ST RESERVED 2 (NON-KEY NAME X(10) IN 200):
248* ST RESERVED 3 (NON-KEY NAME X(10) IN 200):
249* ST RESERVED 4 (NON-KEY NAME X(10) IN 200):
251* ST RESERVED 5 (NON-KEY NAME X(10) IN 200):
252* ST RESERVED 9 (NON-KEY NAME X(10) IN 200):
300* STUDENT FOLLOW-UP (RG IN 200):
   301* SFU YR (NON-KEY NAME X(2) IN 300):
   302* SFU SEQ (NON-KEY NAME X IN 300):
   303* SFU EDUC STATUS (NON-KEY NAME X(5) IN 300):
   304* SUF EMPL STATUS (NON-KEY NAME X(5) IN 300):
   305* SFU EMPL AVAIL (NON-KEY NAME X(5) IN 300):
   306* SFU OCC TITLE (NON-KEY NAME X(20) IN 300):
   307* SFU OCC CODE (NON-KEY NAME X(10) IN 300):
   308* SFU OCC LOCUS (NON-KEY NAME X(5) IN 300):
   309* SFU DATE EMPD (NON-KEY DATE IN 300):
   311* SFU HRS PER WEEK (NON-KEY INT NUM 9(2) IN 300):
   312* SFU SALARY (NON-KEY MONEY 9(5).9(2) IN 300):
   313* SFU EMPLOYER NAME (NON-KEY NAME X(25) IN 300):
   314* SFU EMPLOYER SUBUNIT (NON-KEY NAME X(25) IN
          300):
   315* SFU EMPLOYER ADDRESS (NON-KEY NAME X(20) IN
          300):
   316* SFU EMPLOYER CITY (NON-KEY NAME X(10) IN 300):
   317* SFU EMPLOYER STATE (NON-KEY NAME X(2) IN 300):
   318* SFU EMPLOYER ZIP (NON-KEY NAME X(5) IN 300):
   319* SFU EMPLOYER PHONE (NON-KEY NAME X(12) IN
          300):
   321* SFU SPV LAST NAME (NON-KEY NAME X(15) IN 300):
   322* SFU SPV FIRST NAME (NON-KEY NAME X(15) IN 300):
   323* SFU SPV MI (NON-KEY NAME X IN 300):
   324* SFU PERMIT TO INTERVIEW (NON-KEY NAME X IN
          300):
   325* SFU REL TO TRAIN (NON-KEY NAME X(5) IN 300):
   326* SFU SATIS WITH TRAIN (NON-KEY NAME X IN 300):
   327* SFU USE FOR TRAIN (NON-KEY NAME X(5) IN 300):
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328* SFU EMPLOYER SATIS WITH ST (NON-KEY NAME X IN
       300):
329* SFU EMPLOYER SATIS WITH PGM (NON-KEY NAME IN
       300):
331* SFU RESERVED 1 (NON-KEY NAME X(10) IN 300):
332* SFU RESERVED 2 (NON-KEY NAME X(10) IN 300):
333* SFU RESERVED 3 (NON-KEY NAME X(10) IN 300):
334* SFU RESERVED 4 (NON-KEY NAME X(10) IN 300):
335* SFU RESERVED 5 (NON-KEY NAME X(10) IN 300):
336* SFU RESERVED 6 (NON-KEY NAME X(10) IN 300):
350* OCCUPATIONAL DUTIES (RG IN 300):
   351* JD SEQ (NON-KEY NAME X(2) IN 350):
   352* JD DUTY (NON-KEY NAME X(40) IN 350):
   353* JD RESERVED 1 (NON-KEY NAME X(10) IN 350):
   354* JD RESERVED 2 (NON-KEY NAME X(10) IN 350):
   335* JD RESERVED 3 (NON-KEY NAME X(10) IN 350):
   356* JD RESERVED 4 (NON-KEY NAME X(10) IN 350):
   357* JD RESERVED 5 (NON-KEY NAME X(10) IN 350):
   358* JD RESERVED 6 (NON-KEY NAME X(10) IN 350):
3000* DISADVANTAGING CONDITIONS (RG IN 200):
  3001* DC COND CODE (NON-KEY NAME X(5) IN 3000):
  3002* DC COND (NON-KEY NAME X(20) IN 3000):
  3003* DC RESERVED 1 (NON-KEY NAME X(10) IN 3000):
  3004* DC RESERVED 2 (NON-KEY NAME X(10) IN 3000):
3020* HANDICAPPING CONTITIONS (RG IN 200):
  3021* HC COND CODE (NON-KEY NAME X(5) IN 3020):
  3022* HC COND (NON-KEY NAME X(20) IN 3020):
  3023* HC RESERVED 1 (NON-KEY NAME X(10) IN 3020):
  3024* HC RESERVED 2 (NON-KEY NAME X(10) IN 3020):
3040* SPECIAL NEEDS SERVICES (RG IN 200):
  3041* SN SERV CODE (NON-KEY NAME X(5) IN 3040):
  3042* SN SERV (NON-KEY NAME X(20) IN 3040):
  3043* SN RESERVED 1 (NON-KEY NAME X(10) IN 3040):
  3044* SN RESERVED 2 (NON-KEY NAME X(10) IN 3040):
400* STUDENT INTEREST (RG IN 200):
  401* SI PGM CODE (NON-KEY NAME X(10) IN 400):
  402* SI PGM (NON-KEY NAME X(15) IN 400):
  403* SI LEVEL (NON-KEY NAME X IN 400):
  404* SI RESEPVED 1 (NON-KEY NAME X(10) IN 400):
  405* SI RESERVED 2 (NON-KEY NAME X(10) IN 400):
  406* SI RESERVED 3 (NON-KEY NAME X(10) IN 400):
  407* SI RESERVED 4 (NON-KEY NAME X(10) IN 400):
  408* SI RESERVED 5 (NON-KEY NAME X(10) IN 400):
  409* SI RESERVED 6 (NON-KEY NAME X(10) IN 400):
420* STUDENT ACADEMIC DATA (RG IN 200):
  421* SA TERM (NON-KEY NAME X IN 400):
  422* SA COURSE CODE (NON-KEY NAME X(5) IN 420):
  423* SA COURSE (NON-KEY NAME X(15) IN 420):
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424* SA GRADE (NON-KEY NAME X(2) IN 420):
425* SA RESERVED 1 (NON-KEY NAME X(10) IN 420):
426* SA RESERVED 2 (NON-KEY NAME X(10) IN 420):
427* SA RESERVED 3 (NON-KEY NAME X(10) IN 420):
428* SA RESERVED 4 (NON-KEY NAME X(10) IN 420):
429* SA RESERVED 5 (NON-KEY NAME X(10) IN 420):
431* SA RESERVED 6 (NON-KEY NAME X(10) IN 420):
440* STUDENT TEST DATA (RG IN 200):
 441* TS TEST (NON-KEY NAME X(10) IN 440):
 442* TS DATE GIVEN (NON-KEY DATE IN 440):
 443* TS SUBTEST SCORE 1 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 444* TS SUBTEST SCORE 2 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 445* TS SUBTEST SCORE 3 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 446* TS SUBTEST SCORE 4 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 447* TS SUBTEST SCORE 5 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 448* TS SUBTEST SCORE 6 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 449* TS SUBTEST SCORE 7 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 451* TS SUBTEST SCORE 8 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 452* TS SUBTEST SCORE 9 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 453* TS SUBTEST SCORE 10 (NON-KEY DEC NUM 9(4).9(2)
        IN 440):
 454* TS RESERVED 1 (NON-KEY NAME X(10) IN 440):
 455* TS RESERVED 2 (NON-KEY NAME X(10) IN 440):
 456* TS RESERVED 3 (NON-KEY NAME X(10) IN 440):
 457* TS RESERVED 4 (NON-KEY NAME X(10) IN 440):
 458* TS RESERVED 5 (NON-KEY NAME X(10) IN 440):
 459* TS RESERVED 6 (NON-KEY NAME X(1)) IN 440):
500* LOCAL PROGRAM INFORMATION (RG IN 90):
 501* LP RG USAGE (NON-KEY NAME X IN 500):
 502* LP APPLIC CODE (NON-KEY NAME X(10) IN 500):
 503* LP LOCAL PGM STATUS (NON-KEY NAME X(5) IN 500):
 504* LP APPROVAL STATUS (NON-KEY NAME X(5) IN 500):
 505* LP BUDGET YR (NON-KEY NAME X(2) IN 500):
 506* LP CYCLE (NON-KEY NAME X IN 500):
 507* LP START DATE (NON-KEY DATE IN 500):
 508* LP END DATE (NON-KEY DATE IN 500):
 509* LP DURATION (NON-KEY NAME X(2) IN 500):
 511* LP ENROLL FREQ (NON-KEY NAME X(2) IN 500):
 512* LP OPEN ENTRY-EXIT (NON-KEY NAME X IN 500):
 513* LP ENTEND-FLEX SCHED (NON-KEY NAME X IN 500):
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514* LP NUM LOCATIONS (NON-KEY INT NUM 9(3) IN 500):
515* LP SQ FT DIRECT INST (NON-KEY INT NUM 9(7) IN
       500):
516* LP SQ FT REL INST (NON-KEY INT NUM 9(7) IN
       500):
517* LP HRS PER WK UTIL DIRECT INST (NON-KEY INT
       NUM 9(2) IN 500):
518* LP HRS PER WK UTIL REL INST (NON-KEY INT NUM
       9(2) IN 500):
519* LP MALE ENROLL (NON-KEY INT NUM 9(4) IN 500):
521* LP FEMALE ENROLL (NON-KEY INT NUM 9(4) IN 500):
522* LP TOTAL ENROLL (NON-KEY INT NUM 9(4) IN 500):
523* LP FTE ENROLL (NON-KEY DEC NUM 9(4).9(2) IN
       500):
524* LP COSTS 1 (NON-KEY MONEY 9(6).9(2) IN 500):
525* LP COSTS 2 (NON-KET MONEY 9(6).9(2) IN 500):
526* LP COSTS 3 (NON-KEY MONEY 9(6).9(2) IN 500):
527* LP COSTS 4 (NON-KEY MONEY 9(6).9(2) IN 500):
528* LP COSTS 5 (NON-KEY MONEY 9(6).9(2) IN 500):
529* LP COSTS 6 (NON-KEY MONEY 9(6).9(2) IN 500):
531* LP COSTS 7 (NON-KEY MONEY 9(6).9(2) IN 500):
532* LP COSTS 8 (NON-KEY MONEY 9(6).9(2) IN 500):
533* LP COSTS 9 (NON-KEY MONEY 9(6).9(2) IN 500):
534* LP COSTS 10 (NON-KEY MONEY 9(6).9(2) IN 500):
535* LP COSTS 11 (NON-KEY MONEY 9(6).9(2) IN 500):
536* LP COSTS 12 (NON-KEY MONEY 9(6).9(2) IN 500):
537* LP COSTS 13 (NON-KEY MONEY 9(6).9(2) IN 500):
538* LP COSTS 14 (NON-KEY MONEY 9(6).9(2) IN 500):
539* LP COSTS 15 (NON-KEY MONEY 9(6).9(2) IN 500):
541* LP COSTS 16 (NON-KEY MONEY 9(6).9(2) IN 500):
542* LP COSTS 17 (NON-KEY MONEY 9(6).9(2) IN 500):
543* LP COSTS 18 (NON-KEY MONEY 9(6).9(2) IN 500):
544* LP COSTS 19 (NON-KEY MONEY 9(6).9(2) IN 500):
545* LP COSTS 20 (NON-KEY MONEY 9(6).9(2) IN 500):
546* LP AMT FED SUPPORT (NON-KEY MONEY 9(6).9(2) IN
       500):
547* LP AMT STATE SUPPORT (NON-KEY MONEY 9(6).9(2)
       IN 500):
548* LP FUNDING TYPE (NON-KEY NAME X(5) IN 500):
549* LP RESERVED 1 (NON-KEY NAME X(10) IN 500):
551* LP RESERVED 2 (NON-KEY NAME X(10) IN 500):
552* LP RESERVED 3 (NON-KEY NAME X(10) IN 500):
553* LP RESERVED 4 (NON-KEY NAME X(10) IN 500):
554* LP RESERVED 5 (NON-KEY NAME X(10) IN 500):
555* LP RESERVED 6 (NON-KEY NAME X(10) IN 500):
600* PROJECTED STAFF REQUIREMENTS (RG IN 500):
  601* PS PSN CODE (NON-KEY NAME X(5) IN 600):
  602* PS PSN (NON-KEY NAME X(15) IN 600):
  603* PS NUM FT (NON-KEY INT NUM 9(3) IN 600):
  604* PS NUM PT (NON-KEY INT NUM 9(3) IN 600):
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605* PS TOTAL NUM (NON-KEY INT NUM 9(3) IN 600):
606* PS FTE PERS (NON-KEY DEC NUM 9(3).9(2) IN
        600):
607* PS RESERVED 1 (NON-KEY NAME X(10) IN 600):
608* PS RESERVED 2 (NON-KEY NAME X(10) IN 600):
609* PS RESERVED 3 (NON-KEY NAME X(10) IN 600):
611* PS RESERVED 4 (NON-KEY NAME X(10) IN 600):
612* PS RESERVED 5 (NON-KEY NAME X(10) IN 600):
613* PS RESERVED 6 (NON-KEY NAME X(10) IN 600):
620* POTENTIAL OCCUPATIONS (RG IN 500):
621* PO OCC CODE (NAME X(10) IN 620):
622( PO OCC (NON-KEY NAME X(20) IN 620):
623* PD HOURLY WAGE (NON-KEY MONEY 9(2).9(2) IN
        620):
624* PO RESERVED 1 (NON-KEY NAME X(10) IN 620):
625* PO RESERVED 2 (NON-KEY NAME X(10) IN 620):
626* PO RESERVED 3 (NON-KEY NAME X(10) IN 620):
627* PO RESERVED 4 (NON-KEY NAME X(10) IN 620):
628* PO RESERVED 5 (NON-KEY NAME X(10) IN 620):
629* PO RESERVED 6 (NON-KEY NAME X(10) IN 620):
640* TERMINAL COMPETENCIES (RG IN 500):
641* TC COMPT CODE (NON-KEY NAME X(5) IN 640):
642* TC COMPT (NON-KEY NAME X(20) IN 640):
643* TC RESERVED 1 (NON-KEY NAME X(10) IN 640):
644* TC RESERVED 2 (NON-KEY NAME X(10) IN 640):
645* TC RESERVED 3 (NON-KEY NANE X(10) IN 640):
646* TC RESERVED 4 (NON-KEY NAME X(10) IN 640):
647* TC RESERVED 5 (NON-KEY NAME X(10) IN 640):
648* TC RESERVED 6 (NON-KEY NAME X(10) IN 640):
660* COURSE INFORMATION (RG IN 500):
661* CRS COURSE CODE (NON-KEY NAME X(5) IN 660):
662* CRS COURSE (NON-KEY NAME X(20) IN 660):
663* CRS HRS PER WK (NON-KEY INT NUM 9(2) IN 660):
664* CRS NUM WKS (NON-KEY INT NUM 9(2) IN 660):
665* CRS TOTAL CONTACT HRS (NON-KEY INT NUM 9(4)
        IN 660):
666* CRS RESERVED 1 (NON-KEY NAME X(10) IN 660):
667* CRS RESERVED 2 (NON-KEY NAME X(10) IN 660):
668* CRS RESERVED 3 (NON-KEY NAME X(10) IN 660):
669* CRS RESERVED 4 (NON-KEY NAME X(10) IN 660):
671* CRS RESERVED 5 (NON-KEY NAME X(10) IN 660):
672* CRS RESERVED 6 (NON-KEY NAME X(10) IN 660):
700* AGGREGATE BEGINNING-OF-TERM INFORMATION (RG IN
        90):
701* BT GRADE (NON-KEY NAME X(2) IN 700):
702* BT SEX (NON-KEY NAME X IN 700):
703* BT PGM OBJ (NON-KEY NAME X(5) IN 700):
704* BT NUM STUDENTS (NON-KEY INT NUM 9(4) IN 700):
705* BT NUM COOP EDUC (NON-KEY INT NUM 9(4) IN
        700):
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715* BT NUM SPANISH (NON-KEY INT NUM 9(4) IN 700):
716* BT NUM BLACK (NON-KEY INT NUM 9(4) IN 700):
717* BT NUM ASIAN-PI (NON-KEY INT NUM 9(4) IN 700):
718* BT NUM AMER INDIAN (NON-KEY INT NUM 9(4) IN 700):
719* BT NUM WHITE (NON-KEY INT NUM 9(4) IN 700):
735* BT NUM DISAD (NON-KEY INT NUM 9(4) IN 700):
736* BT NUM ACAD DISAD (NON-KEY INT NUM 9(4) IN 700):
737* BT NUM ECON DISAD (NON-KEY INT NUM 9(4) IN 700):
738* BT NUM ILLIT (NON-KEY NUM 9(4) IN 700):
739* BT NUM OTHER LANG (NON-KEY INT NUM 9(4) IN 700):
741* BT NUM LACK EDUC SKILLS (NON-KEY INT NUM 9(4) IN 700):
742* BT NUM POOR ATTEN (NON-KEY INT NUM 9(4) IN 700):
743* BT NUM OTHER DISAD (NON-KEY INT NUM 9(4) IN 700).
744* BT NUM MULTI DISAD (NON-KEY INT NUM 9(4) IN 700):
745* BT NUM HANDI (NON-KEY INT NUM 9(4) IN 700):
746* NUM EMOT PROBLEMS (NON-KEY INT NUM 9(4) IN 700):
747* BT NUM LEARNING DISAB (NON-KEY INT NUM 9(4) IN 700):
748* BT NUM MENTAL RETARD (NON-KEY INT NUM 9(4) IN 700):
749* BT NUM DRUG DEPEND (NON-KEY INT NUM 9(4) IN 700):
751* BT NUM VISION IMPAIRED (NON-KEY INT NUM 9(4) IN 700):
752* BT NUM BLIND (NON-KEY INT NUM 9(4) IN 700):
753* BT NUM HEARING IMPAIRED (NON-KEY INT NUM 9(4) IN 700):
754* BT NUM DEAF (NON-KEY INT NUM 9(4) IN 700):
755* BT NUM DEAF-BLIND (NON-KEY INT NUM 9(4) IN 700):
756* BT NUM SPEECH IMPAIRED (NON-KEY INT NUM 9(4) IN 700):
757* BT NUM ORTHO IMPAIRED (NON-KEY INT NUM 9(4) IN 700):
758* BT NUM OTHER HEALTH IMPAIRED (NON-KEY INT NUM 9(4) IN 700):
759* BT NUM MULTI HANDI (NON-KEY INT NUM 9(4) IN 700):

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761* BT NUM HANDI REG SETTING (NON-KEY INT NUM 9(4)
      IN 700):
762* BT NUM HANDI MIXED SETTING (NON-KEY INT NUM
      9(4) IN 700):
763* BT NUM HANDI SEP SETTING (NON-KEY INT NUM
      9(4) IN 700):
764* BT NUM HANDI SEP FACIL (NON-KEY INT NUM 9(4)
      IN 700):
765* BT NUM HANDI OTHER SETTING (NON-KEY INT NUM
      9(4) IN 700):
766* BT RESERVED 1 (NON-KEY INT NUM 9(4) IN 700):
767* BT RESERVED 2 (NON-KEY INT NUM 9(4) IN 700):
768* BT RESERVED 3 (NON-KEY INT NUM 9(4) IN 700):
769* BT RESERVED 4 (NON-KEY INT NUM 9(4) IN 700):
771* BT RESERVED 5 (NON-KEY INT NUM 9(4) IN 700):
772* BT RESERVED 6 (NON-KEY INT NUM 9(4) IN 700):
800* AGGREGATE END-OF-TERM INFORMATION (RG IN 90):
 801* ET EOT STATUS (NON-KEY NAME X(5) IN 800):
 802* ET RESERVED 1 (NON-KEY NAME X(10) IN 800):
 803* ET RESERVED 2 (NON-KEY NAME X(10) IN 800):
 810* EOT INFORMATION (RG IN 800):
  811* ET SEX (NON-KEY NAME X IN 810):
  812* ET GRADE (NON-KEY NAME X(2) IN 810):
  813* ET PGM OBJ (NON-KEY NAME X(5) IN 810):
  814* ET NUM STUDENTS (NON-KEY INT NUM 9(4) IN
        810):
  815* ET NUM SPANISH (NON-KEY INT NUM 9(4) IN
        810):
  816* ET NUM BLACK (NON-KEY INT NUM 9(4) IN 810):
  817* ET NUM ASIAN-PI (NON-KEY INT NUM 9(4) IN
        810):
  818* ET NUM AMER INDIAN (NON-KEY INT NUM 9(4)
        IN 810):
  819* ET NUM WHITE (NON-KEY INT NUM 9(4) IN 810):
  821* ET NUM EMPD REL CIV (NON-KEY INT NUM 9(4)
        IN 810):
  822* ET NUM EMPD REL MIL (NON-KEY INT NUM 9(4)
        IN 810):
  823* ET NUM EMPD NOT REL CIV (NON-KEY INT NUM
        9(4) IN 810):
  824* ET NUM EMPD NOT REL MIL (NON-KEY INT NUM
        9(4) IN 810):
  825* ET NUM EMPD PT REL (NON-KEY INT NUM 9(4)
        IN 810):
  826* ET NUM EMPD PT NOT REL (NON-KEY INT NUM
        9(4) IN 810):
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827* ET NUM EMPD STATUS UNK (NON-KEY INT NUM 9(4) IN 810):
828* ET NUM UMEMPD (NON-KEY INT NUM 9(4) IN 810):
829* ET NUM NOT AVAIL (NON-KEY INT NUM 9(4) IN 810):
831* ET NUM PLACED BY SCHOOL (NON-KEY INT NUM 9(4) IN 810):
832* ET NUM CONTIN EDUC (NON-KEY INT NUM 9(4) IN 810):
833* ET NUM COOP EDUC (NON-KEY INT NUM 9(4) IN 810):
834* ET NUM MEMBER ST ORG (NON-KEY INT NUM 9(4) IN 810):
835* ET NUM DISAD (NON-KEY INT NUM 9(4) IN 810):
836* ET NUM ACAD DISAD (NON-KEY INT NUM 9(4) IN 810):
837* ET NUM ECON DISAD (NON-KEY INT NUM 9(4) IN 810):
838* ET NUM ILLIT (NON-KEY INT NUM 9(4) IN 810):
839* ET NUM OTHER LANG (NON-KEY INT NUM 9(4) IN 810):
841* ET NUM LACK EDUC SKILLS (NON-KEY INT NUM 9(4) IN 810):
842* ET NUM POOR ATTEND (NON-KEY INT NUM 9(4) IN 810):
843* ET NUM OTHER DISAD (NON-KEY INT NUM 9(4) IN 810):
844* ET NUM MULTI DISAD (NON-KEY INT NUM 9(4) IN 810):
845* ET NUM HANDI (NON-KEY INT NUM 9(4) IN 810):
846* ET NUM EMOT PROBLEMS (NON-KEY INT NUM 9(4) IN 810):
847* ET NUM LEARNING DISAD (NON-KEY INT NUM 9(4) IN 810):
848* ET NUM MENTAL RETARD (NON-KEY INT NUM 9(4) IN 810):
849* ET NUM DRUG DEPEND (NON-KEY INT NUM 9(4) IN 810):
851* ET NUM VISION IMPAIRED (NON-KEY INT NUM 9(4) IN 810):
852* ET NUM BLIND (NON-KEY INT NUM 9(4) IN 810):
853* ET NUM HEARING IMPAIRED (NON-KEY INT NUM 9(4) IN 810):
854* ET NUM DEAF (NON-KEY INT NUM 9(4) IN 810):
855* ET NUM DEAF-BLIND (NON-KEY INT NUM 9(4) IN 810):
856* ET NUM SPEECH IMPAIRED (NON-KEY INT NUM 9(4) IN 810):

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857* ET NUM ORTHO IMPAIRED (NON-KEY INT NUM 9(4)
      IN 810):
858* ET NUM OTHER HEALTH IMPARIED (NON-KEY INT
      NUM 9(4) IN 810):
859* ET NUM MULTI HANDI (NON-KEY INT NUM 9(4) IN
      810):
861* ET NUM HANDI REG SETTING (NON-KEY INT NUM
      9(4) IN 810):
862* ET NUM HANDI MIXED SETTING (NON-KEY INT NUM
      9(4) IN 810):
863* ET NUM HANDI SEP SETTING (NON-KEY INT NUM
      9(4) IN 810):
864* ET NUM HANDI SEP FACIL (NON-KEY INT NUM 9(4)
      IN 810):
865* ET NUM HANDI OTHER SETTING (NON-KEY INT NUM
      9(4) IN 810):
866* ET NUM BASIC EDUC (NON-KEY INT NUM 9(4) IN
      810):
867* ET NUM SPEC JOB (NON-KEY INT NUM 9(4) IN
      810):
868* ET NUM PSYCH-SW (NON-KEY INT NUM 9(4) IN
      810):
869* ET NUM MOBILE UNIT (NON-KEY INT NUM 9(4) IN
      810):
871* ET NUM SPEC TRANSPORT (NON-KEY INT NUM 9(4)
      IN 810):
872* ET NUM BUREAU VOC REHAB (NON-KEY INT NUM
      9(4) IN 810):
873* ET NUM ENGLISH INST (NON-KEY INT NUM 9(4)
      IN 810):
874* ET NUM RD-INT (NON-KEY INT NUM 9(4) IN 810):
875* ET NUM OTHER SPEC NEEDS SERV (NON-KEY INT
      NUM 9(4) IN 810):
876* ET TOTAL NUM SPEC NEEDS SERV (NON-KEY INT
      NUM 9(4) IN 810):
877* ET RESERVED 1 (NON-KEY INT NUM 9(4) IN 810):
878* ET RESERVED 2 (NON-KEY INT NUM 9(4) IN 810):
879* ET RESERVED 3 (NON-KEY INT NUM 9(4) IN 810):
881* ET RESERVED 4 (NON-KEY INT NUM 9(4) IN 810):
882* ET RESERVED 5 (NON-KEY INT NUM 9(4) IN 810):
883* ET RESERVED 6 (NON-KEY INT NUM 9(4) IN 810):
3918* KONTROL NODE K ( RG IN 90):
  3919* DUMMY K (NON-KEY NAME X IN 3918):
  900* EMPLOYER FOLLOW-UP (RG IN 3918):
    901* EFU SEQ (NON-KEY NAME X IN 900):
    902* EFU CYCLE (NON-KEY NAME X IN 900):
    903* EFU PERIOD (NON-KEY NAME X(2) IN 900):
    904* EFU YR (NON-KEY NAME X(2)IN 900):
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905* EFU SEX (NON-KEY NAME X IN 900):
906* EFU ETHNIC GROUP (NON-KEY NAME X(5) IN 900):
907* EFU STATUS (NON-KEY NAME X(5) IN 900):
908* EFU TECH KNL RATING (NON-KEY INT NUM 9 IN 900):
909* EFU WORK ATT RATING (NON-KEY INT NUM 9 IN 900):
911* EFU WORK QUALITY RATING (NON-KEY INT NUM 9 IN
        900):
912* EFU VOCED RATING (NON-KEY INT NUM 9 IN 900):
913* EFU PREP (NON-KEY INT NUM 9 IN 900):
914* EFU NUM PERS (NON-KEY INT NUM 9(3) IN 900):
915* EFU RESERVED 1 (NON-KEY NAME X(10) IN 900):
916* EFU RESERVED 2 (NON-KEY NAME X(10) IN 900):
917* EFU RESERVED 3 (NON-KEY NAME X(10) IN 900):
918* EFU RESERVED 4 (NON-KEY NAME X(10) IN 900):
919* EFU RESERVED 5 (NON-KEY NAME X(10) IN 900):
921* EFU RESERVED 6 (NON-KEY NAME X(10) IN 900):
3922* KONTROL NODE M (RG IN 90):
  3923* DUMMY M (NON-KEY NAME X IN 3922):
  930* EQUIPMENT REQUESTS (RG IN 3922):
    931* ER EQUIP CODE (NAME X(10) IN 930):
    932* ER EQUIP NAME (NON-KEY NAME X(20) IN 930):
    933* ER NUM UNITS REQ (NON-KEY INT NUM 9(3) IN 930):
    934* ER UNIT PURCHASE COST (NON-KEY MONEY 9(6).9(2)
           IN 930):
    935* ER UNIT CONTRACT COST (NON-KEY MONEY 9(6).9(2)
           IN 930):
    936* ER MAX TOTAL COST (NON-KEY MONEY 9(6).9(2)
           IN 930):
    937* ER NUM UNITS APPROVED (NON-KEY INT NUM 9(3)
           IN 930):
    938* ER APPROVAL STATUS (NON-KEY NAME X IN 930):
    939* ER PURPOSE (NON-KEY NAME X(20) IN 930):
    941* ER VENDOR NAME (NON-KEY NAME X(20) IN 930):
    942* ER VENDOR ADDRESS (NON-KEY NAME X(15) IN 930):
    943* ER VENDOR CITY (NON-KEY NAME X(10) IN 930):
    944* ER VENDOR STATE (NON-KEY NAME X(2) IN 930):
    945* ER VENDOR ZIP (NON-KEY NAME X(5) IN 930):
    946* ER VENDOR PHONE (NON-KEY NAME X(12) IN 930):
    947* ER VENDOR CONTACT PERSON (NON-KEY NAME X(20)
           IN 930):
    948* ER RESERVED 1 (NON-KEY NAME X(10) IN 930):
    949* ER RESERVED 2 (NON-KEY NAME X(10) IN 930):
    951* ER RESERVED 3 (NON-KEY NAME X(10) IN 930):
    952* ER RESERVED 4 (NON-KEY NAME X(10) IN 930):
    953* ER RESERVED 5 (NON-KEY NAME X(10) IN 930):
    954* ER RESERVED 6 (NON-KEY NAME X(10) IN 930):
3920* KONTROL NODE L (RG IN 90):
  3921* DUMMY L (NON-KEY NAME X IN 3920):
  960* EQUIPMENT INVENTORY (RG IN 3920):
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961* EI INVEN CODE (NAME X(10) IN 960):
962* EI EQUIP CODE (NAME X(10) IN 960):
963* EI EQUIP NAME (NON-KEY NAME X(20) IN 960):
964* EI ACQ DATE (NON-KEY DATE IN 960):
965* EI ACQ TYPE (NON-KEY NAME X(5) IN 960):
966* EI USEFUL LIFE (NON-KEY INT NUM 9(2) IN 960):
967* EI TERMIN DATE (NON-KEY DATE IN 960):
968* EI COST (NON-KEY MONEY 9(6).9(2) IN 960):
969* EI SERVICE CONTRACT STATUS (NON-KEY X(5) IN
      960):
971* EI SERVICE CONTRACT COST (NON-KEY MONEY 9(4).
      9(2) IN 960):
972* EI VENDOR NAME (NON-KEY NAME X(20) IN 960):
973* EI VENDOR ADDRESS (NON-KEY NAME X(15) IN 960):
974* EI VENDOR CITY (NON-KEY NAME X(10) IN 960):
975* EI VENDOR STATE (NON-KEY NAME X(2) IN 960):
976* EI VENDOR ZIP (NON-KEY NAME X(5) IN 960):
977* EI VENDOR PHONE (NON-KEY NAME X(12) IN 960):
978* EI VENDOR CONTACT PERSON (NON-KEY NAME X(20)
      IN 960):
979* EI RESERVED 1 (NON-KEY NAME X(10) IN 960):
981* EI RESERVED 2 (NON-KEY NAME X(10) IN 960):
982* EI RESERVED 3 (NON-KEY NAME X(10) IN 960):
983* EI RESERVED 4 (NON-KEY NAME X(10) IN 960):
984* EI RESERVED 5 (NON-KEY NAME X(10) IN 960):
985* EI RESERVED 6 (NON-KEY NAME X(10) IN 960):
3900* KONTROL NODE A (RG IN 50):
  3901* DUMMY A (NON-KEY NAME X IN 3900):
  100* STAFF INFORMATION (RG IN 3900):
    101* SF LAST NAME (NAME X(15) IN 100):
    102* SF FIRST NAME (NAME X(15) IN 100):
    103* SF MI (NAME X IN 100):
    104* SF SSN (NAME X(11) IN 100):
    105* SF ID (NAME X(10) IN 100):
    106* SF ADDRESS (NON-KEY NAME X(20) IN 100):
    107* SF CITY (NON-KEY NAME X(10) IN 100):
    108* SF STATE (NON-KEY NAME X(2) IN 100):
    109* SF ZIP (NON-KEY NAME X(5) IN 100):
    111* SF PHONE (NON-KEY NAME X(12) IN 100):
    112* SF SEX (NON-KEY NAME X IN 100):
    113* SF ETHNIC GROUP (NON-KEY NAME X(5) IN 100):
    114* SF AGE (NON-KEY NAME X(2) IN 100):
    115* SF MOS TEACH EXPER (NON-KEY INT NUM 9(3) IN
          100):
    116* SF YRS EDUC (NON-KEY DEC NUM 9(3).9(1) IN 100):
    117* SF HIGHEST DEGREE (NON-KEY NAME X(5) IN 100):
    118* SF ANN COURSE CREDIT HRS (NON-KEY INT NUM
          9(3) IN 100):
    119* SF ANN WORKSHOP HRS (NON-KEY INT NUM 9(3) in
          100):
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121* SF ANN WORK REL EXPER HRS (NON-KEY INT NUM
       9(3) IN 100):
122* SF CUM COURSE CREDIT HRS (NON-KEY INT NUM
       9(5) IN 100):
123* SF CUM WORKSHOP HRS (NON-KEY INT NUM 9(5) IN
       100):
124* SF CUM WORK REL EXPER HRS (NON-KEY INT NUM
       9(5) IN 100):
125* SF RESERVED 1 (NON-KEY NAME X(10) IN 100):
12   SF RESERVED 2 (NON-KEY NAME X(10) IN 100):
127* SF RESERVED 3 (NON-KEY INT NUM 9(5) IN 100):
128* SF RESERVED 4 (NON-KEY INT NUM 9(5) IN 100):
129* SF RESERVED 5 (NON-KEY DEC NUM 9(5).9(2) IN
       100):
131* SF RESERVED 6 (NON-KEY DEC NUM 9(5).9(2) IN
       100):
140* STAFF CREDENTIAL INFORMATION (RG IN 100):
  141* SC CRED CODE (NAME X(10) IN 140):
  142* SC CRED FIELD CODE (NAME X(10) IN 140):
  143* SC CRED FIELD (NON-KEY NAME X(15) IN 140):
  144* SC CRED PSN CODE (NAME X(10) IN 140):
  145* SC CRED PSN (NON-KEY NAME X(15) IN 140):
  146* SC STATUS (NON-KEY NAME X(5) IN 140):
  147* SC LEVEL (NON-KEY NAME X IN 140):
  148* SC APPLIC DATE (NON-KEY DATE IN 140):
  149* SC CRED DATE (NON-KEY DATE IN 140):
  151* SC CRED EXP DATE (DATE IN 140):
  152* SC OCC CRED (NON-KEY NAME X(10) IN 140):
  153* SC OCC CRED DATE (NON-KEY DATE IN 140):
  154* SC OCC CRED EXP DATE (DATE IN 140):
  155* SC RESERVED 1 (NON-KEY NAME X(10) IN 140):
  156* SC RESERVED 2 (NON-KEY NAME X(10) IN 140):
  157* SC RESERVED 3 (NOM-KEY NAME X(10) IN 140):
  158* SC RESERVED 4 (NON-KEY NAME X(10) IN 140):
  159* SC RESERVED 5 (NON-KEY NAME X(10) IN 140):
  161* SC RESERVED 6 (NON-KEY NAME X(10) IN 140):
170* STAFF CURRENT ASSIGNMENTS (RG IN 100):
  171* SA ASSIGN CODE (NON-KEY NAMF X(10) IN 170):
  172* SA PSN CODE (NON-KEY NAME X(10) IN 170):
  173* SA PSN (NON-KEY NAME X(15) IN 170):
  174* SA LEA CODE (NON-KEY NAME X(15) IN 170):
  175* SA LEA (NON-KEY NAME X(20) IN 170):
  176* SA SCHL CODE (NON-KEY NAME X(5) IN 170):
  177* SA SCHL (NON-KEY NAME X(20) IN 170):
  178* SA PGM CODE (NON-KEY NAME X(10) IN 170):
  179* SA PGM (NON-KEY NAME X(20) IN 170):
  181* SA FIELD CODE (NON-KEY NAME X(10) IN 170):
  182* SA FIELD (NON-KEY NAME X(20) IN 170):
  183* SA LOCAL PGM CODE (NON-KEY NAME X(10) IN
         170):
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        184* SA LOCAL PGM (NON-KEY NAME X(20) IN 170):
        185* SA LOCAL PGM TYPE (NON-KEY NAME X(5) IN 170):
        186* SA FTE (NON-KEY DEC NUM 9(1).9(2) IN 170):
        187* SA RESERVED 1 (NON-KEY NAME X(10) IN 170):
        188* SA RESERVED 2 (NON-KEY NAME X(10) IN 170):
        189* SA RESERVED 3 (NON-KEY NAME X(10) IN 170):
        1891* SA RESERVED 4 (NON-KEY NAME X(10) IN 170):
        1892* SA RESERVED 5 (NON-KEY NAME X(10) IN 170):
        1893* SA RESERVED 6 (NON-KEY NAME X(10) IN 170):
      190* STAFF LANGUAGES SPOKEN (RG IN 100):
        191* SL LANG (NON-KEY NAME X(10) IN 190):
        192* SL SPEAKING PROFCY (NON-KEY NAME X IN 190):
        193* SL READING PROFCY (NON-KEY NAME X IN 190):
        194* SL RESERVED 1 (NON-KEY NAME X(10) IN 190):
        195* SL RESERVED 2 (NON-KEY NAME X(10) IN 190):
        196* SL RESERVED 3 (NON-KEY NAME X(10) IN 190):
        197* SL RESERVED 4 (NON-KEY NAME X(10) IN 190):
2000* CENSUS DATA (RG IN 50):
  2001* CEN YR (NAME XX IN 2000):
  2100* POPULATION (RG IN 2000):
    2101* POPULATION-X (NON-KEY NAME X IN 2100):
    2110* POPLN (RG IN 2100):
      2111* POP TOTAL POP (NON-KEY INT NUM 9(10) IN
              2110):
      2112* BLC TOTAL POP (NON-KEY INT NUM 9(10) IN
              2110):
      2113* BLC POP 15-19 (NON-KEY INT NUM 9(10) IN
              2110):
      2114* BLC POP 20-24 (NON-KEY INT NUM 9(10) IN
              2110):
      2115* BLC POP 25-64 (NON-KEY INT NUM 9(10) IN
              2110):
      2116* POP RESERVED 1 (NON-KEY INT NUM 9(10) IN
              2110):
      2117* POP RESERVED 2 (NON-KEY INT NUM 9(10) IN
              2110):
      2118* POP RESERVED 3 (NON-KEY INT NUM 9(10) IN
              2110):
      2119* POP RESERVED 4 (NON-KEY INT NUM 9(10) IN
              2110):
      2121* POP RESERVED 5 (NON-KEY INT NUM 9(10) IN
              2110):
    2130* PERSONS AGE X SEX (RG IN 2100):
      2131* AS SEX (NON-KEY NAME X IN 2130):
      2132* AS AGE GROUP (NON-KEY NAME X(5) IN 2130):
      2133* AS NUM PERS (NON-KEY INT NUM 9(10) IN 2130):
      2134* AS RESERVED 1 (NON-KEY INT NUM 9(10) IN
              2130):
      2135* AS RESERVED 2 (NON-KEY INT NUM 9(10) IN
              2130):
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    2136* AS RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2130):
    2137* AS RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2130):
  2150* FAMILIES TYPE X PAOC (RG IN 2100):
    2151* FT FAMILY TYPE (NON-KEY NAME X(5) IN 2150):
    2152* FT PAOC CODE (NON-KEY NAME X(5) IN 2150):
    2153* FT NUM FAMS (NON-KEY INT NUM 9(10) IN 2150):
    2154* FT RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2150):
    2155* FT RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2150):
    2156* FT RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2150):
    2157* FT RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2150):
    2158* FT RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2150):
2200* INCOME (RG IN 2000):
  2201* INCOME-X (NON-KEY NAME X IN 2200):
  2210* AGGREGATE INCOME (RG IN 2200):
    2211* AI FAMILY INCOME (NON-KEY MONEY 9(8).9(2)
            IN 2210):
    2212* AI TOTAL INDIV INCOME (NON-KEY MONEY 9(8).
            9(2) IN 2210):
    2213* AI MALE INDIV INCOME (NON-KEY MONEY 9(8).
            9(2) IN 2210):
    2214* AI FEMALE INDIV INCOME (NON-KEY MONEY
            9(8).9(2) IN 2210):
    2215* AI RESERVED 1 (NON-KEY DEC NUM 9(8).9(2)
            IN 2210):
    2216* AI RESERVED 2 (NON-KEY DEC NUM 9(8).9(2)
            IN 2210):
    2217* AI RESERVED 3 (NON-KEY DEC NUM 9(8).9(2)
            IN 2210):
    2218* AI RESERVED 4 (NON-KEY DEC NUM 9(8).9(2)
            IN 2210):
    2219* AI RESERVED 5 (NON-KEY DEC NUM 9(8).9(2)
            IN 2210):
  2230* CATEGORICAL INCOME (RG IN 2200):
    2231* CI INCOME GROUP (NON-KEY NAME X(5) IN 2230):
    2232* CI NUM FAMS (NON-KEY INT NUM 9(10) IN 2230):
    2233* CI NUM PERS (NON-KEY INT NUM 9(10) IN 2230):
    2234* CI NUM MALES (NON-KEY INT NUM 9(10) IN
            2230):
    2235* CI NUM FEMALES (NON-KEY INT NUM 9(10) IN
            2230):
    2236* CI RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2230):
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    2237* CI RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2230):
    2238* CI RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2230):
    2239* CI RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2230):
    2241* CI RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2230):
  2250* FAMILIES BELOW POVERTY LEVEL (RG IN 2200):
    2251* BP NUM FAMS (NON-KEY INT NUM 9(10) IN 2250):
    2252* BP RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2250):
    2253* BP RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2250):
    2254* BP RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2250):
    2255* BP RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2250):
    2256* BP RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2250):
  2270* FAMILIES PRC X HEAD X POVERTY STATUS (RG IN
          2200):
    2271* HP POV STATUS (NON-KEY NAME X(5) IN 2270):
    2272* HP HEAD (NON-KEY NAME X(5) IN 2270):
    2273* HP PRES REL CHILD (NON-KEY NAME X(5) IN
            2270):
    2274* HP NUM PERS (NON-KEY INT NUM 9(10) IN 2270):
    2275* HP PCT PERS (NON-KEY DEC NUM 9(3).9(2) IN
            2270):
    2276* HP RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2270):
    2277* HP RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2270):
    2278* HP RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2270):
    2279* HP RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2270):
    2281* HP RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2270):
2300* ORIGINS (RG IN 2000):
  2301* ORIGINS-X (NON-KEY X IN 2300):
  2310* PERSONS PARENTAGE (RG IN 2300):
    2311* PRT NUM PERS NATIVE (NON-KEY INT NUM 9(10)
            IN 2310):
    2312* PRT NUM PERS FOREIGN (NON-KEY INT NUM 9(10)
            IN 2310):
    2313* PRT RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2310):
    2314* PRT RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2310):
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  2315* PRT RESERVED 3 (NON-KEY INT NUM 9(10) IN
          2310):
  2316* PRT RESERVED 4 (NON-KEY INT NUM 9(10) IN
          2310):
  2317* PRT RESERVED 5 (NON-KEY INT NUM 9(10) IN
          2310):
2330* PERSONS MT X PARENTAGE (RG IN 2300):
  2331* MT PARENT CODE (NON-KEY NAME X(5) IN 2330):
  2332* MT PARENT (NON-KEY NAME X(20) IN 2330):
  2333* MT LANG CODE (NON-KEY X(5) IN 2330):
  2334* MT LANG (NON-KEY NAME X(20) IN 2330):
  2335* MT NUM PERS (NON-KEY INT NUM 9(10) IN 2330):
  2336* MT RESERVED 1 (NON-KEY INT NUM 9(10) IN
          2330):
  2337* MT RESERVED 2 (NON-KEY INT NUM 9(10) IN
          2330):
  2338* MT RESERVED 3 (NON-KEY INT NUM 9(10) IN
          2330):
  2339* MT RESERVED 4 (NON-KEY INT NUM 9(10) IN
          2330):
  2341* MT RESERVED 5 (NON-KEY INT NUM 9(10) IN
          2330):
2350* PERSONS SPNISH INDICATORS (RG IN 2300):
  2351* SP NUM PERS SPNISH ORIGIN (NON-KEY INT NUM
          9(10) IN 2350):
  2352* SP NUM PERS PR ORIGIN (NON-KEY INT NUM
          9(10) IN 2350):
  2353* SP NUM PERS SPNISH LANG (NON-KEY INT NUM
          9(10) IN 2350):
  2354* SP NUM PERS SPNISH SURNAME (NON-KEY INT NUM
          9(10) IN 2350):
  2355* SP RESERVED 1 (NON-KEY INT NUM 9(10) IN
          2350):
  2356* SP RESERVED 2 (NON-KEY INT NUM 9(10) IN
          2350):
  2357* SP RESERVED 3 (NON-KEY INT NUM 9(10) IN
          2350):
  2358* SP RESERVED 4 (NON-KEY INT NUM 9(10) IN
          2350):
  2359* SP RESERVED 5 (NON-KEY INT NUM 9(10) IN
          2350):
2370* PERSONS CITIZENSHIP X AGE (RG IN 2300):
  2371* CA CITIZ CODE (NON-KEY NAME X(5) IN 2370):
  2372* CA CITIZ (NON-KEY X(20) IN 2370):
  2373* CA AGE GROUP (NON-KEY NAME X(5) IN 2370):
  2374* CA NUM PERS (NON-KEY INT NUM 9(10) IN 2370):
  2375* CA RESERVED 1 (NON-KEY INT NUM 9(10) IN
          2370):
  2376* CA RESERVED 2 (NON-KEY INT NUM 9(10) IN
          2370):
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2377* CA RESERVED 3 (NON-KEY INT NUM 9(10) IN
2370):
2378* CA RESERVED 4 (NON-KEY INT NUM 9(10) IN
2370):
2379* CA RESERVED 5 (NON-KEY INT NUM 9(10) IN
2370):
2400* EDUCATION (RG IN 2000):
2401* EDUCATION-X (NON-KEY NAME X IN 2400):
2410* SCHOOL ENROLLMENT LEVEL X TYPE (RG IN 2400):
2411* SCLT SCHL TYPE CODE (NON-KEY NAME X(5) IN
2410):
2412* SCLT SCHL TYPE (NON-KEY NAME X(20) IN 2410):
2413* SCLT LEVEL CODE (NON-KEY NAME X(5) IN 2410):
2414* SCLT LEVEL (NON-KEY NAME X(15) IN 2410):
2415* SCLT NUM PERS (NON-KEY INT NUM 9(10) IN
2410):
2416* SCLT RESERVED 1 (NON-KEY INT NUM 9(10) IN
2410):
2417* SCLT RESERVED 2 (NON-KEY INT NUM 9(10) IN
2410):
2418* SCLT RESERVED 3 (NON-KEY INT NUM 9(10) IN
2410):
2419* SCLT RESERVED 4 (NON-KEY INT NUM 9(10) IN
2410):
2420* SCLT RESERVED 5 (NON-KEY INT NUM 9(10) IN
2410):
2430* SCHOOL ENROLLMENT AGE (RG IN 2400):
2431* SCA AGE GROUP (NON-KEY NAME X(5) IN 2430):
2432* SCA NUM PERS (NON-KEY INT NUM 9(10) IN 2430):
2433* SCA RESERVED 1 (NON-KEY INT NUM 9(10) IN
2430):
2434* SCA RESERVED 2 (NON-KEY INT NUM 9(10) IN
2430):
2435* SCA RESERVED 3 (NON-KEY INT NUM 9(10) IN
2430):
2436* SCA RESERVED 4 (NON-KEY INT NUM 9(10) IN
2430):
2437* SCA RESERVED 5 (NON-KEY INT NUM 9(10) IN
2430):
2440* PERSONS COMPLETING SCHOOL (RG IN 2400):
2441* SCC NUM PERS HS (NON-KEY INT NUM 9(10) IN
2440):
2442* SCC NUM PERS COLL (NON-KEY INT NUM 9(10) IN
2440):
2443* SCC RESERVED 1 (NON-KEY INT NUM 9(10) IN
2440):
2444* SCC RESERVED 2 (NON-KEY INT NUM 9(10) IN
2440):
2445* SCC RESERVED 3 (NON-KEY INT NUM 9(10) IN
2440):

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    2446* SCC RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2440):
    2447* SCC RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2440):
  2450* PERSONS NT IN SCHOOL (RG IN 2400):
    2451* SCN SEX (NON-KEY NAME X IN 2450):
    2452* SCN EMPL STATUS (NON-KEY NAME X (5) IN 2450):
    2453* SCN NUM PERS (NON-KEY INT NUM 9(10) IN 2450):
    2454* SCN RESERVED 1 (NON-KEY INT NUM 9(10) IN 2450):
    2455* SCN RESERVED 2 (NON-KEY INT NUM 9(10) IN 2450):
    2456* SCN RESERVED 3 (NON-KEY INT NUM 9(10) IN 2450):
    2457* SCN RESERVED 4 (NON-KEY INT NUM 9(10) IN 2450):
    2458* SCN RESERVED 5 (NON-KEY INT NUM 9(10) IN 2450):
  2460* PERSONS COMPLETING SCHOOL X SEX (RG IN 2400):
    2461* SCS1 SEX (NON-KEY NAME X IN 2460):
    2462* SCS1 YRS CODE (NON-KEY NAME X(5) IN 2460):
    2463* SCS1 NUM PERS (NON-KEY INT NUM 9(10) IN 2460):
    2464* SCS1 RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2460):
    2465* SCS1 RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2460):
    2466* SCS1 RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2460):
    2467* SCS1 RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2460):
    2468* SCS1 RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2460):
  2470* PERSONS NO COLLEGE COMPLETING SCHOOL X SEX (RG
          IN 2400):
    2471* COL SEX (NON-KEY NAME X IN 2470):
    2472* COL NUM PERS VOCED (NON-KEY INT NUM 9(10) IN
            2470):
    2473* COL NUM PERS NO VOCED (NON-KEY INT NUM 9(10)
            IN 2470):
    2474* COL RESERVED 1 (NON-KEY INT NUM 9(10) IN 2470):
    2475* COL RESERVED 2 (NON-KEY INT NUM 9(10) IN 2470):
    2476* COL RESERVED 3 (NON-KEY INT NUM 9(10) IN 2470):
    2477* COL RESERVED 4 (NON-KEY INT NUM 9(10) IN 2470):
    2478* COL RESERVED 5 (NON-KEY INT NUM 9(10) IN 2470):
  2480* OTHER PERSONS COMPLETING SCHOOL X SEX (RG IN
          2400):
    2481* SCS2 SEX (NON-KEY NAME X IN 2480):
    2482* SCS2 YRS CODE (NON-KEY NAME X(5) IN 2480):
    2483* SCS2 NUM PERS (NON-KEY INT NUM 9(10) IN 2480):
    2484* SCS2 RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2480):
    2485* SCS2 RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2480):
    2486* SCS2 RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2480):
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2487* SCS2 RESERVED 4 (NON-KEY INT NUM 9(10) IN
        2480):
2488* SCS2 RESERVED 5 (NON-KEY INT NUM 9(10) IN
        2480):
2500* LABOR FORCE (RG IN 2000):
  2501* LABOR-FORCE-X (NON-KEY NAME X IN 2500):
  2510* PERSONS DISAB X EMPL STATUS X SEX (RG IN 2500):
  2511* EMP SEX (NON-KEY NAME X IN 2510):
  2512* EMP DISAB-EMPL STATUS (NON-KEY NAME X(5) IN
          2510):
  2513* EMP NUM PERS (NON-KEY INT NUM 9(10) IN 2510):
  2514* EMP RESERVED 1 (NON-KEY INT NUM 9(10) IN 2510):
  2515* EMP RESERVED 2 (NON-KEY INT NUM 9(10) IN 2510):
  2516* EMP RESERVED 3 (NON-KEY INT NUM 9(10) IN 2510):
  2517* EMP RESERVED 4 (NON-KEY INT NUM 9(10) IN 2510):
  2518* EMP RESERVED 5 (NON-KEY INT NUM 9(10) IN 2510):
2530* PERSONS SEX X CHARACTERISTICS (RG IN 2500):
  2531* LFC SEX (NON-KEY NAME X IN 2530):
  2532* LFC LABOR FORCE CHAR (NON-KEY NAME X(5) IN
          2530):
  2533* LFC NUM PERS (NON-KEY INT NUM 9(10) IN 2530):
  2434* LFC RESERVED 1 (NON-KEY INT NUM 9(10) IN 2530):
  2535* LFC RESERVED 2 (NON-KEY INT NUM 9(10) IN 2530):
  2536* LFC RESERVED 3 (NON-KEY INT NUM 9(10) IN 2530):
  2537* LFC RESERVED 4 (NON-KEY INT NUM 9(10) IN 2530):
  2538* LFC RESERVED 5 (NON-KEY INT NUM 9(10) IN 2530):
2550* PERSONS IN LABOR FORCE AGE X SEX (RG IN 2500):
  2551* LFAS SEX (NON-KEY NAME X IN 2550):
  2552* LFAS AGE GROUP (NON-KEY NAME X(5) IN 2550):
  2553* LFAS NUM PERS (NON-KEY INT NUM 9(10) IN 2550):
  2554* LFAS RESERVED 1 (NON-KEY INT NUM 9(10) IN
          2550):
  2555* LFAS RESERVED 2 (NON-KEY INT NUM 9(10) IN
          2550):
  2556* LFAS RESERVED 3 (NON-KEY INT NUM 9(10) IN
          2550):
  2557* LFAS RESERVED 4 (NON-KEY INT NUM 9(10) IN
          2550):
  2558* LFAS RESERVED 5 (NON-KEY INT NUM 9(10) IN
          2550):
2600* OCCUPATIONS (RG IN 2000):
  2601* OCCUPATIONS-X (NON-KEY NAME X IN 2600):
  2610* PERSONS OCCUPATIONS (RG IN 2600):
    2611* OC OCC CODE (NAME X(10) IN 2610):
    2612* OC OCC (NON-KEY NAME X(20) IN 2610):
    2613* OC NUM PERS (NON-KEY INT NUM 9(10) IN 2610):
    2614* OC RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2610):
    2615* OC RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2610):
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    2616* OC RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2610):
    2617* OC RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2610):
    2618* OC RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2610):
  2630* FEMALES OCCUPATIONS (RG IN 2600):
    2631* OCF OCC CODE (NAME X(10) IN 2630):
    2632* OCF OCC (NON-KEY NAME X(20) IN 2630):
    2633* OCF NUM PERS (NON-KEY INT NUM 9(10) IN 2630):
    2634* OCF RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2630):
    2635* OCF RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2630):
    2636* OCF RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2630):
    2637* OCF RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2630):
    2638* OCF RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2630):
2700* INDUSTRIES (RG IN 2000):
  2701* INDUSTRIES-X (NON-KEY NAME X IN 2700):
  2710* PERSONS INDUSTRY X SEX (RG IN 2700):
    2711* IS SEX (NON-KEY NAME X IN 2710):
    2712* IS IND CODE (NAME X(10) IN 2710):
    2713* IS IND (NON-KEY NAME X(20) IN 2710):
    2714* IS NUM PERS (NON-KEY INT NUM 9(10) IN 2710):
    2715* IS RESERVED 1 (NON-KEY INT NUM 9(10) IN
            2710):
    2716* IS RESERVED 2 (NON-KEY INT NUM 9(10) IN
            2710):
    2717* IS RESERVED 3 (NON-KEY INT NUM 9(10) IN
            2710):
    2718* IS RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2710):
    2719* IS RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2710):
2800* EXTRA (RG IN 2000):
  2801* EXTRA-X (NON-KEY NAME X IN 2800):
  2810* EXTRA-1 (RG IN 2800):
    2811* EX1 RESERVED 1 (NON-KEY NAME X(20) IN 2810):
    2812* EX1 RESERVED 2 (NON-KEY NAME X(20) IN 2810):
    2813* EX1 RESERVED 3 (NON-KEY NAME X(20) IN 2810):
    2814* EX1 RESERVED 4 (NON-KEY INT NUM 9(10) IN
            2810):
    2815* EX1 RESERVED 5 (NON-KEY INT NUM 9(10) IN
            2810):
    2816* EX1 RESERVED 6 (NON-KEY INT NUM 9(10) IN
            2810):
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  2817* EX1 RESERVED 7 (NON-KEY DEC NUM 9(8).9(2) IN
        2810):
  2818* EX1 RESERVED 8 (NON-KEY DEC NUM 9(8).9(2) IN
        2810):
  2819* EX1 RESERVED 9 (NON-KEY DEC NUM 9(8).9(2) IN
        2810):
2820* EXTRA-2 (RG IN 2800):
  2821* EX2 RESERVED 1 (NON-KEY NAME X(20) IN 2820):
  2822* EX2 RESERVED 2 (NON-KEY NAME X(20) IN 2820):
  2823* EX2 RESERVED 3 (NON-KEY NAME X(20) IN 2820):
  2824* EX2 RESERVED 4 (NON-KEY NAME X(20) IN 2820):
  2825* EX2 RESERVED 5 (NON-KEY NAME X(20) IN 2820):
  2826* EX2 RESERVED 6 (NON-KEY NAME X(20) IN 2820):
  2827* EX2 RESERVED 7 (NON-KEY DEC NUM 9(8).9(2) IN
        2820):
  2828* EX2 RESERVED 8 (NON-KEY DEC NUM 9(8).9(2) IN
        2820):
  2829* EX2 RESERVED 9 (NON-KEY DEC NUM 9(8).9(2) IN
        2820):
2830* EXTRA-3 (RG IN 2800):
  2831* EX3 RESERVED 1 (NON-KEY NAME X(20) IN 2830):
  2832* EX3 RESERVED 2 (NON-KEY NAME X(20) IN 2830):
  2833* EX3 RESERVED 3 (NON-KEY NAME X(20) IN 2830):
  2834* EX3 RESERVED 4 (NON-KEY INT NUM 9(10) IN
        2830):
  2835* EX3 RESERVED 5 (NON-KEY INT NUM 9(10) IN
        2830):
  2836* EX3 RESERVED 6 (NON-KEY INT NUM 9(10) IN
        2830):
  2837* EX3 RESERVED 7 (NON-KEY DEC NUM 9(8).9(2) IN
        2830):
  2838* EX3 RESERVED 8 (NON-KEY DEC NUM 9(8).9(2) IN
        2830):
  2839* EX3 RESERVED 9 (NON-KEY DEC NUM 9(8).9(2) IN
        2830):
2840* EXTRA-4 (RG IN 2800):
  2841* EX4 RESERVED 1 (NON-KEY NAME X(20) IN 2840):
  2842* EX4 RESERVED 2 (NON-KEY NAME X(20) IN 2840):
  2843* EX4 RESERVED 3 (NON-KEY NAME X(20) IN 2840):
  2844* EX4 RESERVED 4 (NON-KEY INT NUM 9(10) IN
        2840):
  2845* EX4 RESERVED 5 (NON-KEY INT NUM 9(10) IN
        2840):
  2846* EX4 RESERVED 6 (NON-KEY INT NUM 9(10) IN
        2840):
  2847* EX4 RESERVED 7 (NON-KEY DEC NUM 9(8).9(2) IN
        2840):
  2849* EX4 RESERVED 8 (NON-KEY DEC NUM 9(8).9(2) IN
        2840):
  2861* FX4 RESERVED 9 (NON-KEY DEC NUM 9(8).9(2) IN
        2840):
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2850* EXTRA-5 (RG IN 2800):
  2851* EX5 RESERVED 1 (NON-KEY NAME X(20) IN 2850):
  2852* EX5 RESERVED 2 (NON-KEY NAME X(20) IN 2850):
  2853* EX5 RESERVED 3 (NON-KEY NAME X(20) IN 2850):
  2854* EX5 RESERVED 4 (NON-KEY INT NUM 9(10) IN
          2850):
  2855* EX5 RESERVED 5 (NON-KEY INT NUM 9(10) IN
          2850):
  2856* EX5 RESERVED 6 (NON-KEY INT NUM 9(10) IN
          2850):
  2857* EX5 RESERVED 7 (NON-KEY DEC NUM 9(8).9(2) IN
          2850):
  2858* EX5 RESERVED 8 (NON-KEY DEC NUM 9(8).9(2) IN
          2850):
  2859* EX5 RESERVED 9 (NON-KEY DEC NUM 9(8).9(2) IN
          2850):
3902* KONTROL NODE B (RG IN 20):
  3903* DUMMY B (NON-KEY NAME X IN 3902):
  1000* OE PROGRAM ID (RG IN 3902):
    1001* OE PGM-GRP CODE (NAME X(7) IN 1000):
    1002* OE PGM-GRP (NON-KEY NAME X(30) IN 1000):
    1003* OE FIELD CODE (NAME X(2) IN 1000):
    1004* OE FIELD (NON-KEY NAME X(20) IN 1000):
    1005* OE RESERVED 1 (NON-KEY NAME X(20) IN 1000):
    1006* OE RESERVED 2 (NON-KEY NAME X(20) IN 1000):
    1007* OE RESERVED 3 (NON-KEY NAME X(20) IN 1000):
    1008* OE RESERVED 4 (NON-KEY NAME X(20) IN 1000):
    1009* OE RESERVED 5 (NON-KEY NAME X(20) IN 1000):
    1011* OE RESERVED 6 (NON-KEY NAME X(20) IN 1000):
    1050* OE ENROLLMENT INFORMATION (RG IN 1000):
      1051* OEE TOTAL NUM (NOM-KEY INT NUM 9(10) IN
              1050):
      1052* BLE TOTAL NUM UNDUP (NON-KEY INT NUM 9(10)
              IN 1050):
      1053* BLE TOTAL NUM DUP (NON-KEY INT NUM 9(10)
              IN 1050):
      1054* OEE NUM FEMALE (NON-KEY INT NUM 9(10) IN
              1050):
      1055* OEE NUM SEC (NON-KEY INT NUM 9(10) IN
              1050):
      1056* BLE NUM SEC (NON-KEY INT NUM 9(10) IN
              1050):
      1057* OEE NUM POST-SEC (NON-KEY INT NUM 9(10) IN
              1050):
      1058* BLE NUM POST-SEC (NON-KEY INT NUM 9(10) IN
              1050):
      1059* OEE NUM ADULT PREP (NON-KEY INT NUM 9(10)
              IN 1050):
      1061* OEE NUM ADULT SUPP (NON-KEY INT NUM 9(10)
              IN 1050):
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1062* OEE NUM ADULT APPREN (NON-KEY INT NUM 9(10)
        9(10) IN 1050):
1063* BLE NUM ADULT (NON-KEY INT NUM 9(10) IN
        1050):
1064* OEE NUM COOP (NON-KEY INT NUM 9(10) IN
        1050):
1073* BLE NUM COOP (NON-KEY INT NUM 9(10) IN
        1050):
1065* OEE NUM COMPLETERS (NON-KEY INT NUM 9(10)
        IN 1050):
1066* OEE RESERVED 1 (NON-KEY INT NUM 9(10) IN
        1050):
1067* OEE RESERVED 2 (NON-KEY INT NUM 9(10) IN
        1050):
1068* OEE RESERVED 3 (NON-KEY INT NUM 9(10) IN
        1050):
1069* OEE RESERVED 4 (NON-KEY INT NUM 9(10) IN
        1050):
1071* OEE RESERVED 5 (NON-KEY INT NUM 9(10) IN
        1050):
1072* OEE RESERVED 6 (NON-KEY INT NUM 9(10) IN
        1050):
1100* OE PLACEMENT INFORMATION (RG IN 1000):
  1101* OEP LEVEL (NAME X IN 1100):
  1102* OEP NUM COMPLETERS (NON-KEY INT NUM 9(10)
          IN 1100):
  1103* BLP NUM COMPLETERS (NON-KEY INT NUM 9(10)
          IN 1100):
  1104* OEP NUM STATUS UNK (NON-KEY INT NUM 9(10)
          IN 1100):
  1105* BLP NUM STATUS UNK (NON-KEY INT NUM 9(10)
          IN 1100):
  1106* OEP NUM NT AVAIL KONTIN EDUC (NON-KEY INT
          NUM 9(10) IN 1100):
  1107* BLP NUM NT AVAIL KONTIN EDUC (NON-KEY INT
          NUM 9(10) IN 1100):
  1108* OEP NUM NT AVAIL OTHER (NON-KEY INT NUM
          9(10) IN 1100):
  1109* OPE NUM EMPD FT REL (NON-KEY INT NUM 9(10)
          IN 1100):
  1111* BLP NUM EMPD REL (NON-KEY INT NUM 9(10)
          IN 1100):
  1112* OEP NUM AVAIL NT EMPD (NON-KEY INT NUM
          9(10) IN 1100):
  1113* BLP NUM AVAIL NT EMPD (NON-KEY INT NUM
          9(10) IN 1100):
  1114* OEP NUM EMPD OTHER (NON-KEY INT NUM 9(10)
          IN 1100):
  1115* BLP NUM EMPD OTHER (NON-KEY INT NUM 9(10)
          IN 1100):
  1116* BLP NUM LEAVERS (NON-KEY INT NUM 9(10)
          IN 1100):
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1117* BLP TOTAL NUM NT AVAIL (NON-KEY INT NUM
9(10) IN 1100):
1118* BLP TOTAL NUM AVAIL (NON-KEY INT NUM 9(10)
IN 1100):
1119* OEP RESERVED 1 (NON-KEY INT NUM 9(10) IN
1100):
1121* OEP RESERVED 2 (NON-KEY INT NUM 9(10) IN
1100):
1122* OEP RESERVED 3 (NON-KEY INT NUM 9(10) IN
1100):
1123* OEP RESERVED 4 (NON-KEY INT NUM 9(10) IN
1100):
1124* OEP RESERVED 5 (NON-KEY INT NUM 9(10) IN
1100):
1125* OEP RESERVED 6 (NON-KEY INT NUM 9(10) IN
1100):
1150* OE INSTRUCTIONAL STAFF INFORMATION (RG IN
1000):
1151* OEI NUM UNDUP (NON-KEY INT NUM 9(10) IN
1150):
1152* BLI TOTAL NUM (NON-KEY INT NUM 9(10) IN
1150):
1153* OEI FTE SEC (NON-KEY INT NUM 9(10) IN
1150):
1154* OEI FTE POST-SEC (NON-KEY INT NUM 9(10)
IN 1150):
1155* OEI NUM ADULT FT (NON-KEY INT NUM 9(10)
IN 1150):
1156* BLI NUM ADULT FT (NON-KEY INT NUM 9(10)
IN 1150):
1157* OEI NUM ADULT PT (NON-KEY INT NUM 9(10)
IN 1150):
1158* BLI NUM ADULT PT (NON-KEY INT NUM 9(10)
IN 1150):
1159* OEI NUM TRAIN PRESERV (NON-KEY INT NUM
9(10) IN 1150):
1161* BLI NUM TRAIN PRESERV (NON-KEY INT NUM
9(10) IN 1150):
1162* OEI NUM TRAIN INSERV (NON-KEY INT NUM
9(10) IN 1150):
1163* BLI NUM TRAIN INSERV (NON-KEY INT NUM
9(10) IN 1150):
1164* OEI NUM STATE PLAN PRESERV (NON-KEY INT
NUM 9(10) IN 1150):
1165* OEI NUM STATE PLAN INSERV (NON-KEY INT
NUM 9(10) IN 1150):
1166* OEI RESERVED 1 (NON-KEY INT NUM 9(10) IN
1150):
1167* OEI RESERVED 2 (NON-KEY INT NUM 9(10) IN
1150):
1168* OEI RESERVED 3 (NON-KEY INT NUM 9(10) IN
1150):

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    1169* OEI RESERVED 4 (NON-KEY INT NUM 9(10) IN
            1150):
    1171* OEI RESERVED 5 (NON-KEY INT NUM 9(10) IN
            1150):
    1172* OEI RESERVED 6 (NON-KEY INT NUM 9(10) IN
            1150):
1200* OE ADMINISTATIVE STAFF INFORMATION (RG IN 3902):
  1201* OEA PSN CODE (NAME X(3) IN 1200):
  1202* OEA PSN (NON-KEY NAME X(20) IN 1200):
  1203* OEA NUM SEC FT (NON-KEY INT NUM 9(10) IN 1200):
  1204* OEA NUM SEC PT (NON-KEY INT NUM 9(10) IN 1200):
  1205* OEA NUM POST-SEC FT (NON-KEY INT NUM 9(10) IN
          1200):
  1206* OEA NUM POST-SEC PT (NON-KEY INT NUM 9(10) IN
          1200):
  1207* OEA NUM ADULT FT (NON-KEY NUM 9(10) IN 1200):
  1208* OEA NUM ADULT PT (NON-KEY NUM 9(10) IN 1200):
  1209* OEA NUM UNDUP (NON-KEY INT NUM 9(10) IN 1200):
  1211* OEA RESERVED 1 (NON-KEY INT NUM 9(10) IN 1200):
  1212* OEA RESERVED 2 (NON-KEY INT NUM 9(10) IN 1200):
  1213* OEA RESERVED 3 (NON-KEY INT NUM 9(10) IN 1200):
  1214* OEA RESERVED 4 (NON-KEY INT NUM 9(10) IN 1200):
  1215* OEA RESERVED 5 (NON-KEY INT NUM 9(10) IN 1200):
  1216* OEA RESERVED 6 (NON-KEY INT NUM 9(10) IN 1200):
3904* KONTROL NODE C (RG IN 3902):
  3905* DUMMY C (NON-KEY NAME X IN 3904):
  1600& OE FINANCIAL STATUS INFORMATION (RG IN 3904):
    1601* OEF GRANT CATG CODE (NAME X(5) IN 1600):
    1627* OEF GRANT CATG (NON-KEY NAME X(20) IN 1600):
    1602* OEF FUNCTION CODE (NAME X(5) IN 1600):
    1628* OEF FUNCTION (NON-KEY NAME X(20) IN 1600):
    1629* OEF CARRYOVER YR (NON-KEY NAME XX IN 1600):
    1603* OEF FUNDS PREV REP (NON-KEY MONEY 9(10).9(2)
            IN 1600):
    1604* OEF FUNDS THIS PD (NON-KEY MONEY 9(10).9(2)
            IN 1600):
    1605* OEF PGM INCOME CREDITS (NON-KEY MONEY 9(10).
            9(2) IN 1600):
    1606* OEF NET FUNDS THIS PD (NON-KEY MONEY 9(10).
            9(2) IN 1600):
    1607* OEF FUNDS TO DATE (NON-KEY MONEY 9(10).9(2)
            IN 1600):
    1608* OEF NON-FED FUNDS (NON-KEY MONEY 9(10).9(2)
            IN 1600):
    1609* OEF FED FUNDS (NON-KEY MONEY 9(10).9(2) IN
            1600):
    1611* OEF UNPAID OBL (NON-KEY MONEY 9(10).9(2) IN
            1600):
    1612* OEF NON-FED UNPAID OBL (NON-KEY MONEY 9(10).
            9(2) IN 1600):
```

Field Site Staff Persons

Name	Institution
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