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ABSTRACT

Vocational education programs must provide for the development of competencies required by the labor market. Long-range planning is required to offset the time lags inherent in program development. This report forecasts the potential total vocational education enrollment in a statewide comprehensive school system and the potential enrollment in selected occupations based on projections of the labor force composition. The analysis of the data compares labor force trends to enrollment trends, enrollment trends to output trends, and employed output trends to estimated demand trends. Sample data work sheets and data sources are included. (Author/BH)

FORECASTING GUIDE:

EMPLOYMENT/ENROLLMENT

A Guide to Assist Vocational Educators
in Planning Programs to Meet
Manpower Needs

STATE OF WASHINGTON

COORDINATING COUNCIL FOR OCCUPATIONAL EDUCATION

January, 1972

FORECASTING GUIDE: EMPLOYMENT/ENROLLMENT

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in Planning Programs to Meet
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Prepared by

STATE OF WASHINGTON

COORDINATING COUNCIL FOR OCCUPATIONAL EDUCATION

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Frank H. Wimer

Prepared by

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Preface

The primary purpose of vocational education is to provide programs, services and activities to assist persons to become employed and to remain employed. These programs must provide for the development of competencies which the market place will need; and the time lag required to plan facilities, develop programs, etc., requires a long-range (several years) look at what these skills should be.

The U.S. Department of Labor, Bureau of Labor Statistics, makes projections of trends in terms of major industries and broad occupational groups; but they do not generally make forecasts in terms of educational programs. Harold Goldstein and Neal Rosenthal indicate:

> The Bureau of Labor Statistics (BLS) has published employment outlook information on a national basis for many years. However, BLS traditionally has presented the results of its occupational projections in terms useful to high school students as well as counselors, parents, and others who help young people choose a field of work.
>
> However, planners of educational programs, including college and university training, vocational education, or government-sponsored programs, have a different set of needs.*

This document is a first attempt at forecasting appropriate vocational educational program enrollment to meet "manpower needs," based on the basic assumption "that a comprehensive school system should in general mirror or reflect the kinds of skills required in the world of work." The method attempts to forecast the potential total vocational education enrollment in a statewide, comprehensive school system and the potential enrollment in selected occupations based upon projections of the work force composition. By comparing the elements in the forecast with the actual program output, the system can have "self-correcting feedback," with factors applied to bring the elements into proper balance.

The analysis of data compares work force trends to enrollment trends, enrollment trends to output trends (both completions and employment), and employed output trends to estimated demand trends.

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This method is concerned only with forecasting of "manpower requirements" and does not consider "people needs." Although it uses the latest information from the U.S. Department of Labor, the Washington State Department of Employment Security, census data and research studies, any forecast should be used with discretion and used as only one of several factors upon which to make program planning decisions. It is impossible to predict all of the variables which can affect the future. For example, new inventions, wars, and legislated goals are not easily predicted. If they could be predicted, their effect on a selected occupational field would probably not be known.

Thanks is due to the many who contributed ideas, reacted to assumptions, gave encouragement, typed and retyped drafts, made percentage calculations and made other contributions in the preliminary development. These include:

Richard G. Moe	Education Program Director	Washington State Board for Community College Education
Gilbert Zuerlein	Program Specialist	Washington State Coordinating Council for Occupational Education
Laurence H. Flinn	Planning Specialist	Washington State Coordinating Council for Occupational Education
George Pilant	Research Specialist	Washington State Coordinating Council for Occupational Education
Ben A. Yormark	Vocational Education Director	Highline School District Seattle, Washington
Lew Stewart	Education Secretary	Washington State Labor Council
Ron Wahlers	Labor Market Information	Washington State Department of Employment Security
Wayne W. Welch	Assistant Dean	College of Education University of Minnesota Minneapolis, Minnesota
George Copa	College of Education	University of Minnesota Minneapolis, Minnesota
Billy J. Vice	State Planning Specialist	Bureau of Vocational Education Frankfort, Kentucky
Charles D. Wade	Associate Director	Vocational Education Frankfort, Kentucky
Darrell Ward	State Leadership Chairman	The Ohio State University Center for Vocational Technical Education Columbus, Ohio
Paul Braden	Research & Development Specialist	The Ohio State University Center for Vocational Technical Education Columbus, Ohio

(more)

Joel H. Magisos	Information Services Coordinator	The Ohio State University Center for Vocational Technical Education Columbus, Ohio
David J. Pucel	College of Education	University of Minnesota Minneapolis, Minnesota
Terry Griffin Irene Yarger Virginia Challen Charlene Winner	Secretaries	Washington State Coordinating Council for Occupational Education

Frank H. Wimer
Project Director

* "Occupational Manpower and Training Needs," by Harold Goldstein and Neal Rosenthal, OCCUPATIONAL OUTLOOK QUARTERLY, Fall, 1971, pages 29-31.

FORECASTING SYSTEM OVERVIEW

Educators are entering a new era, an era in which the terms forecasting, programing, evaluation and accountability will take on greater meaning. This is accompanied by an increased need for the utilization of measures of accomplishments in educational planning. When used in the context of a systems approach, each of these can become an integral part of a total system.

While this document deals primarily with forecasting in terms of employment and enrollment, it must necessarily also consider evaluation as it relates to the comparison of forecasted output to forecasted demand. Therefore, two basic ideas are considered:

1. That evaluation must first be concerned with measuring results in terms of goals and objectives (that is, output rather than process oriented).
2. That evaluation must consider not only the output of the system but also must consider the impact of that output in terms of serving the needs which the system is designed to meet.

The primary purpose of vocational education is to provide programs, services and activities to assist persons to become employed. In doing this, the programs should provide for the development of competencies which the market place will need. (1)

There are many aspects of vocational programs which could be evaluated: teacher competencies, facilities and equipment, curriculum content, etc. Each of these is a contributor to the accomplishment of the primary goal of vocational education, but they are not the "end result" expected to be achieved - employment.

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We may evaluate by comparing various "process" components (teachers' competencies, facilities, etc.) with agreed-upon standards, make an analysis, and conclude that the program is "good." And yet, it may be "good" at doing the wrong thing.

The first phase (level) of evaluation should determine "to what extent the primary objective is being met;" that is, "how many of a group of entering enrollees are employed at the end of the normal training time." It is not enough for a high percentage of the graduates to become employed. We must consider the rate of employment of all those who were enrolled. A system which "weeds out" during the process to assure a "high quality" of a reduced output is not efficient.

This system is concerned with the "what happened," a concept which attempts to "collect useful information for the purposes of making sound decisions about programs" (2) as the program output relates to "meeting manpower needs." To determine "why" requires a further look at the process components (teachers, facilities, curriculum, etc.).

Many of the present forecast and evaluation systems make what appear to be false assumptions regarding the comparison of "output" to "demand." The first assumption is that it is possible to measure the output of all the various training systems. No state has been able to measure the total "output."

The second assumption is that "output" from training has an impact on the "demand." But unless the "output" is "employed in the field or directly related field," there has been no impact on the demand.

In view of the above and in order to structure some meaning into forecasting and evaluation, let us start with a primary assumption:

(more)

"that in a comprehensive school system" (3) the skills taught should in general mirror or reflect the kinds of skills required or which will be required in the world. This means that the "potential" (4) total vocational education enrollment in a statewide, comprehensive school system and the "potential" enrollment in selected occupations should be based upon projections of the work force composition.

The first step is to determine the occupational field (5) to be considered and to calculate the percent of average employment in the field for years that data is available, both recent past actual and projected future. By multiplying this percent times the actual and projected total enrollments in a "comprehensive system" for these same years, a line can be plotted on a graph to show what the "potential" enrollment should be, based on the basic assumption (Chart #F/C 2-72).

From official reports, trend lines can also be plotted for the occupational field, showing the actual past and present first year and total enrollments, actual "completions" (6) and actual placements (Chart #F/C 2-72) of the previous year's total enrollees (including those completing and those not completing) in "field for which trained or in a related field" as reported in October each year.

The "potential enrollees" line gives a projection into the future, based on work force trends and projected total enrollment. The other three lines show actual happenings as a result of the school system.

By making comparisons between the four trend lines ("potential enrollees," first year enrollees, total enrollees and placements [employment]), some assumptions can be made as to the balance and condition of the "school system."

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The relationship of the trend lines for "first year enrollees" and "number employed in the field or related field" is significant. Movement toward each other is an indication that the school system is becoming more efficient.

Conversely, lines moving away from each other may indicate that the enrollment is exceeding the demand for the system output, due to poor quality of output or to an actual low demand.

In addition to the charts, various analyses can be made. Examples are to compare the trend of "percentage of average employment" and the trend of "percentage of enrollees in the occupational field," and to determine the completion rate or percentage of those enrolling who become employed in the "field for which trained or a related field" (Analysis Sheet #F/C 3-72).

Since one of the major goals of vocational education is to "meet the demands of the labor market," another important relationship is that of comparing a continuation of the present level of "employed output" and the projected "demand" (growth plus replacements), [7] calculated by dividing the number projected to be "employed" during the forecast period by the projected demand for the same period (Analysis Sheet #F/C 3-72). This comparison is one indicator of the impact which the school system will have in supplying the estimated demand.

Forecasting, evaluating and all the related components can become very complex. But if educators will develop a mental attitude which places first priority on comparing results (output) to goals and objectives, and expend energy on evaluating "process" only when the results are not as expected, the activity will take on greater meaning.

(more)

(1) Public Law 90-576.

(2) "The Relationship Between Evaluation and Accountability," Robert E. Norton, AMERICAN VOCATIONAL JOURNAL, February, 1972, Vol. 47, No. 2.

(3) "Comprehensive school or system" is defined as a school or educational system in which: (1) a full range of program is offered, general academic and vocational; and (2) the enrollment in selected occupational fields can be measured.

(4) "Potential enrollment" indicates what the enrollments probably should be when calculated by the methods described and when based on the assumptions indicated.

(5) "Occupational field" is an arbitrary grouping made for the purposes of planning educational programs (see Procedures, item 7.1). The groups are determined because of common skills or instructional content or because of career ladders. The field is also sometimes separated into more than one group because of licensing requirements, etc. An example is licensed practical nurses and registered nurses which have common skills but different licenses.

(6) U.S. Office of Education report, O.E. form 3139, 5/71, Placement of Program Completions in Vocational Education Programs.

(7) Occupational Manpower and Training Needs, Bulletin #1701, page 22, U.S. Department of Labor.

(8) Occupational Training Information System (OTIS), Division of Research, Planning and Evaluation, Oklahoma State Department of Vocational and Technical Education.

(9) A Systems Approach to State-Local Program Planning, Walter M. Arnold, Pennsylvania Department of Public Instruction, 1969.

Rev. March 13, 1972

CRITERIA, ASSUMPTIONS AND DEFINITIONS

This section contains the criteria used to develop the system, the general assumptions upon which the system is based and the definitions used in the system.

CRITERIA Used to Develop the System

1. Uses available data:

   Surveys or special studies for the basic system will be done only on an exception basis. Undocumented opinions will not be used. Constructed data can be used when actual data is not available.

2. Can be applied to various geographic areas (national, state, regional or local).

3. Can be maintained by an analyst(s), with points identified at which higher level decisions regarding the data can be made.

4. Does not make decisions but displays data and analyzes data to provide information from which planning decisions can be made.

5. Uses a systems approach. It has feed-back mechanisms in which actual happenings in both the work force and in the instructional program output have a corrective effect on the forecast.

6. Data and the analysis of various occupations or fields can be updated without a complete modification of the total document.

GENERAL ASSUMPTIONS Upon Which the System Is Based

1. That the education and training in a "comprehensive school system" should generally reflect or mirror the skills of the world in which the students will find themselves.**

2. That the "percentage of the work force" or "percentage of average employment" in most "occupational fields" changes slowly. When it is evident that in a particular occupation the percent is not remaining constant, that the rate of change be used to modify the projected "percent of the work force" or "percent of average employment" in the occupational field.**

(more)

3. That if the percentage of total enrollment in a "comprehensive system" enrolled in an occupational field does not exceed the "percent of average employment" in the field, the supply will not exceed the demand.**

4. That when it is evident that in a particular occupational field the percentage should be modified for the purposes of calculating enrollments, factors for specific reasons should be applied to modify the percentage. (An example is a high replacement rate occupation - refer to Procedures, item 7.2.)**

5. That when in an individual "comprehensive" school the percent of that school's total students who are enrolled in an occupational field exceeds the percent of the modified average employment in the field, a check should be made of the total state system to determine whether or not there is actually a projected surplus or whether selected schools enroll a higher percent share of the total.

6. That a percentage of the work force is in jobs for which: (1) professional or general programs are appropriate; (2) vocational programs are appropriate; (3) school programs are not needed or appropriate; and that when calculations are made regarding percentages of the work force for these purposes, the groups of occupations for which training is not appropriate should not be considered in the calculations (refer to Procedures, item 4.4).

**DEFINITIONS for the Purposes of This Forecast System

1. "Potential enrollment" indicates what the enrollments probably should be when calculated by the methods described in this system and when based on the assumptions indicated.

2. "Comprehensive school or system" is defined as a school or educational system in which: (1) a full range of program is offered, general academic and vocational; and (2) the enrollment in selected occupational fields can be measured.

3. "Percentage of work force or percentage of average employment" can be used interchangeably for this system. Care must be exercised to assure that the percentage calculations are made using similar figures. One should not calculate a percent by dividing the number of employed workers in a field by the total work force, since the work force includes both employed and unemployed.

4. "Occupational field" is an arbitrary grouping made for the purposes of planning educational programs (see Procedures, item 7.1). The groups are determined because of common skills or instructional content or because of career ladders. The field is also sometimes separated into more than one group because of licensing requirements, etc. An example is licensed practical nurses and registered nurses which have common skills but different licenses.

(more)

5. "Completion rate" is a percentage calculated by dividing the number of persons completing or graduating from the program by the total number of first year enrollees (see Procedures, items 9.2 and 12.0, column 4).

6. "Employment of enrollment" (employment rate) is a percentage calculated by dividing the total number of first year enrollees by the number of this group who are employed "in the field for which trained" or employed "in a related field" (see Procedures, items 10.2 and 12.0, column 6).

7. "Replacement rate" is a percent per year determined by dividing the estimated replacements in the occupation for a certain forecast period by the number employed at the beginning of that time period and by dividing this by the number of years in the same time period (see Procedures, items 7.1A and 13.0).

CHART #F/C 1-72

DATE _____

SYSTEM _____

ANALYST _____

1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976

1.0 Washington State Population (in thousands)
- ----- Projected
- ——— Actual

3,500
3,000
2,500

2.0 Washington State Work Force (in thousands)
- - - - - Projected
- ——— Actual

1,500
1,000

3.0 Washington State Employment Rate (100% less the unemployment rate)
- - - - - - Projected
- ——— Actual

97
96
95
94
93
92
91

5.0 Total enrollment in community college system
- - - - - - - - - Projected
- ——— Actual

6.0 Vocational enrollment (community college)
- — — — 6.1 Potential - 4.6 X 5.0
- - - - - - - 6.2 Projected
- ●—●—● 6.3 Actual

90,000
84,000
78,000
72,000
66,000
60,000
54,000
48,000
42,000
36,000
30,000
24,000
18,000
12,000
6,000
0

DATE _____

SYSTEM _____

ANALYST _____

D A T A S H E E T #F/C 1-72

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
1.0 Population (in thousands)														
Projected														
Actual														
2.0 Work force (in thousands)														
Projected														
Actual														
3.0 Employment rate (100% less the unemployment rate)														
Projected														
Actual														
4.0 Percent of average employment														
4.1 Professional-General														
4.2 Vocational														
4.3 Training Not Applicable														
4.4 Conversion Factor Occupations for which training is appropriate														
4.5 Professional-General (4.1 X 4.4)														
4.6 Vocational (4.2 X 4.4)														
5.0 Total enrollment in system														
Projected (FTE-S)														
Actual (FTE-S)														
6.0 Vocational enrollment (														
6.1 Potential (4.6 X 5.0)														
6.2 Projected FTE-S														
6.2.1 Projected Percent of total (5.0)														
6.3 Actual FTE-S														
6.3.1 Actual Percent of Total (5.0)														

RT #F/C 2-72

1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976

DATE _____

FIELD _____

CODE _____

SYSTEM _____

ANALYST _____

8.0 Enrollment in

8.1 Total

— — — — 8.1.1 Potential - 5.0 X 7.2

---------- 8.1.2 Projected

_____ 8.1.3 Actual

8.2 First Year

---------- 8.2.1 Projected

.-.-.-.-.-. 8.2.2 Actual

9.0 Graduates

--------- Projected

.... Actual

10.0 Employment

--------- Projected

—.—.—.— Actual

DATE_____

FIELD_____

CODE _____

SYSTEM _____

ANALYST_____

DATA SHEET #F/C 2-72

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
7.0 Percent of average employment in														
7.1 Raw														
7.2 Constructed (7.1 X 4.4)														
8.0 Enrollment in														
8.1 Total Potential (5.0 X 7.2)														
Projected														
Actual														
8.2 First Year														
Projected														
Actual														
9.0 Graduates														
Projected														
Actual														
10.0 Employment														
Projected														
Actual														

Length of Program:

DATA WORK SHEET #F/C 7.1A

DATE_____ FIELD_____

ANALYST_____ APPROVED_____

O C C U P A T I O N A L F I E L D

1	2	3	4	5	6	7
Ref #	Job Titles	DOT Codes	OE Codes			

A V E R A G E E M P L O Y M E N T

8	9	10	11	12	13	14	15	16	17
	National					State			
Year	Total Employment	Ref #	Employment in Field	Percent	Year	Total Employment	Ref #	Employment in Field	Percent

D E M A N D

Year	Expansion	Ref #	Replace. Needs	Replace. Percent Per Year	Year	Expansion	Ref #	Replace. Needs	Replace. Percent Per Year

D A T A S O U R C E S

DECISIONS: DATE_____

A. Percent of Average Employment:

B. Replacement Needs Percent:

RATIONALE:

A. Percent of Average Employment:

ANALYST_____

B. Replacement Needs Percent:

APPROVED_____

DATA WORK SHEET #F/C 7.1B

GOVERNORS PLANNING REGIONS

DATE _____

FIELD _____

ANALYST _____

DATE _____			REGION I-II		REGION III		REGION IV		REGION V-VI		REGION VII-XI		REGION VIII		REGION IX-X-XIII		TOTAL STATE	
# IN WORK FORCE			_____		_____		_____		_____		_____		_____		_____		_____	
DOT CODE	JOB TITLES	OE CODE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE	# IN WORK FORCE IN JOB TITLE	% OF WORK FORCE

NOTE: Figure in parentheses total population for which job title reported.

DATE _____ SYSTEM _____

ANALYSIS SHEET #F/C 3-72 ANALYST _____ FIELD _____

APPROVED _____ CODE _____

11.0 Comparison of Trends in Work Force to Enrollment

1 Year	2 "Enrollment in Field"	3 Total FTE-S	4 % of Total FTE-S Enrolled in the "Field" (Col 2 ÷ Col 3)	5 % of Average Employment in the "Field"
			%	%
			%	%
		Change	_____%	_____%

12.0 Comparison of Enrollment to Output

The number of "entering enrollees" is compared with the output of the same "group" in terms of rate of completion (see column 4 below), and rate of employment (see column 6 below) as measured in October following the normal June completion date of the "group."

1 Normal Completion Year	2 # of Entering Enrollees	3 # of Graduates or Completions	4 Completion Rate (Col 3 ÷ Col 2)	5 # Employed in "Field or Related Field"	6 Employment Rate (Col 5 ÷ Col 2)

13.0 Comparison of Output to Demand

Assume a continuation of the 1970 "employment rate" for the forecast period of five years (1970--1975).

$$\text{Expan } (\_\_\_\_\_) + \text{Replace } (\_\_\_\_\_) = \frac{\text{Est Empl Output } (\_\_\_\_\_)}{\text{Est Demand } (\_\_\_\_\_)} = \_\_\_\_\_\%$$

Demand data source _____, page _____.

PROCEDURES (1)

Develop Data Sheet #F/C 1-72 and Chart #F/C 1-72:

1.0 Population

This item is included to show a general trend of the population and comes from the census (see 5.0 below).

2.0 Work Force

The work force figures come from the Washington State Department of Employment Security. Either "total work force" or "average employment" figures can be used but should be so identified.

3.0 Employment Rate

The employment rate is calculated by subtracting the average annual unemployment percentage provided by the Washington State Department of Employment Security from one-hundred percent. This conversion from unemployment to employment is done to show a trend line rise as indicating better conditions.

4.0 Percent of Average Employment

Procedures 4.1, 4.2, 4.3 - Using state or national tables, which group occupations and which include the total employed, and by grouping these as per the assumption #6 (see the Criteria, Assumptions and Definitions section), a percent for each of these three groups may be calculated by dividing the total employment for each group by the total of all three groups each year. Insert in appropriate columns on Data Sheet #F/C 1-72, items 4.1, 4.2 and 4.3.

Procedure 4.4 - To convert percent of average employment, 4.1 Prof-Gen and 4.2 Voc to a percent of the "work force for which training is appropriate," for Prof-Gen (4.5) and Voc (4.6), add the percentages of the total work force in Prof-Gen (4.1) and in Voc (4.2) and divide 100.00 by this figure.

Procedure 4.5, 4.6 - Apply factor 4.4 to the percentages in 4.1 and 4.2 to construct "a percentage of the work force for which training is appropriate" (Prof-Gen 4.5 and Voc 4.6).

5.0 Total Enrollment in System

Use the projections and actuals from official reports of the particular system. Charts #1.0 and #5.0 should be plotted to show relative trends. Select an appropriate range for Chart #5.0 using beginning and ending year data. Adjust the range of Chart #1.0 to approximately reflect the difference in rate of growth or decline.

(more)

6.0 Vocational Enrollment

To calculate numbers for "potential vocational enrollment" in the particular system (6.1), multiply the percent for vocational (4.6) by the system total enrollment (5.0).

Develop a Data Sheet #F/C 2-72 and a Chart #F/C 2-72 for each occupational field identified (see 7.1A).

7.0 Percent of Average Employment in Field

Identify sources and pages of all data.

Procedure 7.1 (Raw Percentage) - This is entered from the decision section of the Data Work Sheet #F/C 7.1A, unless available directly from another documented source.

The percentages for the intervening years can be constructed by assuming a "straight line" change or other rate of change from the actual or projected years.

Procedure 7.1A (Data Work Sheet) - Using the Occupational Outlook Handbook, Dictionary of Occupational Titles, U.S. Department of Labor documents and other documents, determine the groupings to be included in the field. Identify this grouping by job titles, DOT Codes, OE Codes and other codes in the top section of the Data Work Sheet #F/C 7.1A. Refer to definition 4.

Column 1 (ref #) is used to identify various job titles included and assists in clarifying employment data from various sources which include different titles.

Using U.S. Department of Labor statistics, Washington State Department of Employment Security statistics and other research reports and statistics, enter the raw employment data in the appropriate column under the average employment section. Determine the most reasonable estimated, actual/projected percent of the work force or percent of average employment for "selected" years (for which data is available) and enter this decision in the "decision section."

Using the same data sources, identify the expansion and replacement figures and enter in the demand section. Calculate the replacement percent per year for both state and national. Make a decision as to the most consistent and reasonable figures to use and enter in the decision section. Be certain to identify the time period shown (for example: average replacement percent per year from 1970). Include a rationale when data is inconsistent and the decision to be made is not evident.

When demand data is not available, it may be "constructed" by one of several ways:

(more)

"Construction" of an Expansion Figure

1. Apply a national annual expansion rate to the state average employment in the occupational field and multiply by the number of years in the forecast period to "construct" an estimated expansion figure for the forecast period.

or

2. Multiply the state or national percent of average employment in the occupational field times the state average employment to get the number employed for the beginning and ending year of the forecast period, and subtract to "construct" an estimated expansion figure for the forecast period.

"Construction" of a Replacement Figure

Apply a national annual replacement rate to the state average employment in the occupational field during the first year of the forecast and multiply by the number of years in the forecast period to "construct" an estimated replacement figure for the forecast period.

Procedure 7.2 ("Constructed Percentage") - Apply the factor from 4.4 to the figures in 7.1, the "percent of total work force in an occupation or group of occupations," to convert them to a "percent of the work force in occupations for which training is appropriate" for each year (7.2). (At this point other factors such as high turnover rates, etc., should be considered and if appropriate, used to modify the percentage.)

8.0 Enrollment in the Field

Procedure 8.1 (Total Enrollment in the Field)

Procedure 8.1.1 (Potential Total Enrollment) - Calculate 8.1.1 potential enrollment by multiplying (5.0) enrollment in the "system" by (7.2) the "constructed" percentage for each year.

At this point decisions must be made to determine the instructional programs and/or courses which teach to the particular field as identified on Data Work Sheet #F/C 7.1A. This must be done in order to pick up the data from the official enrollment reports.

Procedure 8.1.2 (Projected Total Enrollment) - To be taken from official projections for the "system."

(more)

Procedure 8.1.3 (Actual Total Enrollment) - This should be the actual total enrollment in the occupational field as of October from the official reports.

Procedure 8.2 (First Year Enrollment)

Procedure 8.2.1 (Projected First Year Enrollment in Field) - To be taken from official projections for the "particular education system."

Procedure 8.2.2 (Actual First Year Enrollment in Field) - This should be the actual "first year enrollees" in the field as of October of each year from the official reports.

9.0 Graduates or Completions from the Program

Procedure 9.1 (Projected) - To be taken from official projections if they are available.

Procedure 9.2 (Actual) - This is the actual number of graduates or completions from the "group" normally completing the program the previous year ending in June and should come from the official report.

10.0 Employment

Procedure 10.1 (Projected) - To be taken from official projections if available.

Procedure 10.2 (Actual) - To be taken from official reports of the "particular education system" as of October of each year. Included are both graduates or completions and nongraduates from the previous year's "completing group" (normally completing in June) who are employed "in field for which trained" and employed in a "related field."

Develop an Analysis Sheet #F/C #3-72 for each occupational field.

11.0 Comparison of Trends in Work Force to Enrollment

The purpose of this is to compare, over a time span, the trends of the rate of enrollment and rate of employment in the work force.

Select a span of years for which data is available for both enrollment (Data Sheet #F/C 2-72, item 8.1.3) and percent of average employment in the field (Data Sheet #F/C 2-72, item 7.2).

Show the increasing rates as + and the decreasing rates as - on the line indicating change.

12.0 Comparison of Enrollment to Output

The purpose of this comparison is to determine the rate of completions and rate of employment in the field or related field of all those who enrolled.

(more)

Column 1: In column 1 enter all years for which any data is available on Data Sheet #F/C 2-72, under items 8.2.2, 9.2 and 10.2.

Column 2: In order to track a group of enrollees in terms of completions and placements, subtract the length of the program (noted at bottom of Data Sheet #F/C 2-72) from each year in column 1. In column 2 enter the number in item 8.2.2 from Data Sheet #F/C 2-72 for the year identified by the above subtraction. (Example: in a two-year program, the 1969 completion year reflects the 1967 first year enrollees. Enter the 8.2.2 number for year 1967 in column 2 opposite the 1969 figure in column 1.) Do this for each year shown in column 1.

Column 3: Enter in column 3 the number from Data Sheet #F/C 2-72, item 9.2 for each year shown in column 1.

Column 4: Divide the number in column 3 by the number in column 2 for each year in column 1.

Column 5: Enter in column 5 the number from Data Sheet #F/C 2-72, item 10.2 for each year shown in column 1.

Column 6: Divide the number in column 5 by the number in column 2 for each year in column 1.

13.0 Comparison of Output to Demand

The purpose of this comparison is to determine what portion of the estimated demand can be expected to be filled by the "employed output."

Multiply the number employed for the first year of the forecast period from column 5 in 12.0 by the number of years in the forecast period and place in the "employed output" blank.

Using the demand data from Data Work Sheet #F/C 7.1A, enter in the expansion blank and the replacement blank the estimated expansion and replacement for the forecast period and total for estimated demand. Divide the estimated employed output by this estimated demand.

When the state and national rates of expansion and replacement are different, an additional analysis may be made to indicate the "employed output" to "demand" relationship. If this is done, preface the calculation with this statement: "The preceding is based on the state rates. However, when the national rates are applied to the state average employment, the following relationship occurs:."

Apply the national expansion and replacement rates to the state average employed during the first year of the forecast and make a second 13.0 calculation.

(1) Whenever new data is entered on any sheet, all other sheets should be updated at the same time.

CHART #F/C 1-72

DATE March 24, 1972

SYSTEM [redacted]

ANALYST Winer

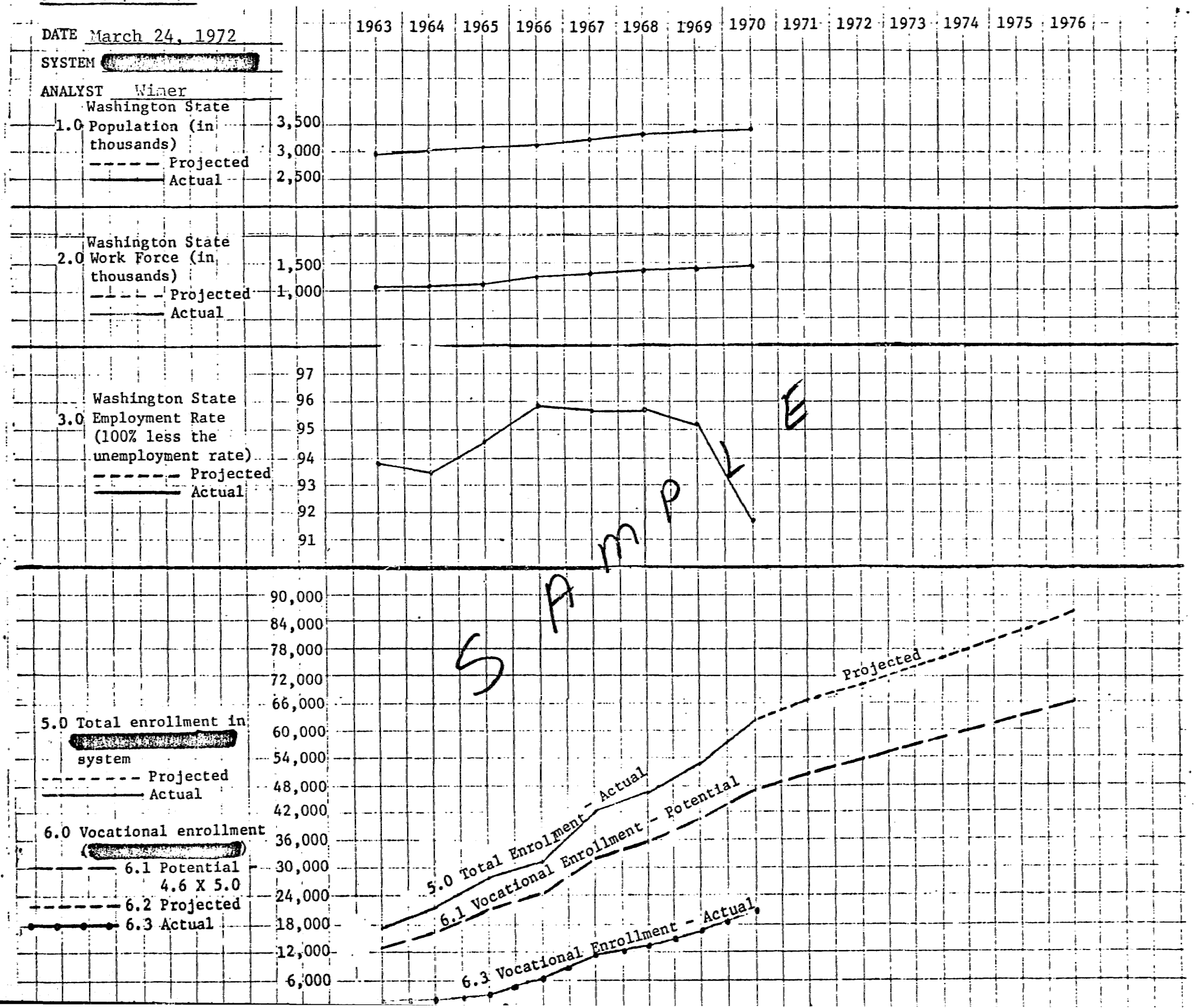
1.0 Washington State Population (in thousands)
- – – – – Projected
——— Actual

2.0 Washington State Work Force (in thousands)
– – – – Projected
——— Actual

3.0 Washington State Employment Rate (100% less the unemployment rate)
– – – – – – Projected
——— Actual

5.0 Total enrollment in [redacted] system
– – – – – – – – Projected
——— Actual

6.0 Vocational enrollment ([redacted])
——— 6.1 Potential 4.6 X 5.0
– – – – – – 6.2 Projected
●——●——● 6.3 Actual



SAMPLE

DATE March 24, 1972

SYSTEM [redacted]

ANALYST Wimer

DATA SHEET #F/C 1-72

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
1.0 Population (in thousands)														
Projected														
Actual	2,972	3,008	3,065	3,125	3,229	3,336	3,397	3,409	3,433	3,420	3,438		3,513	3,765 (1980)
2.0 Work force (in thousands)														
Projected														
Actual	1,131.9	1,141.4	1,171.1	1,259.5	1,313.9	1,370.9	1,398.9	1,405.8						
3.0 Employment rate (100% less the unemployment rate)														
Projected														
Actual	93.8	93.5	94.6	95.9	95.7	95.7	95.2	94.7						
4.0 Percent of average employment														
4.1 Professional-General	(20.09)*							21.69					21.85	
4.2 Vocational	(71.14)*							70.58					70.99	
4.3 Training Not Applicable	(8.77)*							7.73					7.16	
4.4 Conversion Factor	(1.0961)*							1.0838					1.0771	
Occupations for which [redacted] training is appropriate														
4.5 Professional-General (4.1 X 4.4)	22.47	22.62	22.76	22.91	23.06	23.21	23.36	23.51	23.52	23.52	23.53	23.53	23.54	23.54
4.6 Vocational (4.2 X 4.4)	77.53	77.38	77.24	77.09	76.94	76.79	76.64	76.49	76.48	76.48	76.47	76.47	76.46	76.46
5.0 Total enrollment in [redacted] system														
Projected (FTE-S)														
Actual (FTE-S)	17,124	21,691	27,797	31,453	42,124	46,310	52,721	62,430	67,934	70,305	74,286	78,428	82,870	87,043
6.0 Vocational enrollment ([redacted])														
6.1 Potential (4.6 X 5.0)	13,276	16,784	21,470	24,247	32,410	35,561	40,405	47,753	51,373	53,769	56,806	59,973	63,362	66,553
6.2 Projected FTE-S														
6.2.1 Projected Percent of total (5.0)														
6.3 Actual FTE-S	2,254	2,793	3,262	6,849	11,259	13,882	16,460	21,279	26,383					
6.3.1 Actual Percent of total (5.0)	13.16	12.88	11.74	21.78	26.73	29.98	31.22	34.08	38.83					

* Figures for 1960

SAMPLE

CHART #E/C 2-72

DATE March 23, 1972

FIELD [redacted]

CODE (OE) [redacted]

SYSTEM [redacted]

ANALYST Wimer

8.0 Enrollment in [redacted]

8.1 Total

8.1.1 Potential - 5.0 X 7.2

8.1.2 Projected

8.1.3 Actual

8.2 First Year

8.2.1 Projected

8.2.2 Actual

9.0 Graduates

Projected

Actual

10.0 Employment

Projected

Actual

1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976

465 450 435 420 405 390 375 360 345 330 315 300 285 270 255 240 225 210 195 180 165 150 135 120 105 90 75 60 45 30 15

SAMPLE

DATE March 8, 1972

FIELD [redacted]

CODE (OE) [redacted]

SYSTEM [redacted]

ANALYST Wimer

D A T A S H E E T #F/C 2-72

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
7.0 Percent of average employment in [redacted]														
7.1 Raw					.164	.156	.148	.140	.132	.124	.116	.108	.100	.092
7.2 Constructed (7.1 X 4.4)					.180	.171	.162	.152	.143	.134	.126	.117	.108	.099
8.0 Enrollment in [redacted]														
8.1 Total Potential (5.0 X 7.2)					76	79	85	95	97	94	94	92	89	86
Projected														
Actual					111	211	169	173	136					
8.2 First Year Projected														
Actual					71	147	111	127	130					
9.0 Graduates														
Projected														
Actual						32	45	37	68					
10.0 Employment														
Projected														
Actual								35	17					

Length of Program: 2 Years

SAMPLE

DATA WORK SHEET #F/C 7.1A

DATE March 23, 1972

FIELD [redacted]

ANALYST George Rosenzweig

APPROVED

OCCUPATIONAL FIELD

1	2	3	4	5	6	7
Ref #	Job Titles	DOT Codes	OE Codes	HE/OE Code	SPI	
1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

SAMPLE

AVERAGE EMPLOYMENT

8	9	10	11	12	13	14	15	16	17
	National					State			
Year	Total Employment	Ref #	Employment in Field	Percent	Year	Total Employment	Ref #	Employment in Field	Percent
1968	(1) 75,920,000	1	(4) 52,000	.068	1960	(2) 1,020,300	1	(2) 950	.09
1980	(10) 95,100,000	1	(4) 114,000	.12	1970	(2) 1,288,150	1	(2) 1,750	.14
					1975	(2) 1,347,690	1	(2) 1,970	.10

DEMAND

Year	Expansion	Ref #	Replace. Needs	Replace. Percent Per Year	Year	Expansion	Ref #	Replace. Needs	Replace. Percent Per Year
1960-1980	(4) 1,100/yr	1	(4) 700/yr	1.34%	1970-1975	(2) 225	1	(2) 120	1.37%

DATA SOURCES

(1) Page 203

(2) Page 126

(4) Page 70

(10)

DECISIONS: DATE March 23, 1972

A. Percent of Average Employment: Use State figures: 1970 = .14%; 1975 = .10%

B. Replacement Needs Percent: Use State figure: 1.37%/year

RATIONALE:

A. Percent of Average Employment:

B. Replacement Needs Percent:

ANALYST Wimer

APPROVED

DATE March 27, 1972 SYSTEM [redacted]

ANALYSIS SHEET #F/C 3-72 ANALYST Wimer FIELD [redacted]

APPROVED CODE (OE) [redacted]

11.0 Comparison of Trends in Work Force to Enrollment

1	2	3	4	5
Year	"Enrollment in Field"	Total FTE-S	% of Total FTE-S Enrolled in the "Field" (Col 2 ÷ Col 3)	% of Average Employment in the "Field"
1967	111	42,124	.26 %	.180%
1971	136	67,934	.20 %	.143%
		Change	-.06 %	-.037 %

12.0 Comparison of Enrollment to Output

The number of "entering enrollees" is compared with the output of the same "group" in terms of rate of completion (see column 4 below), and rate of employment (see column 6 below) as measured in October following the normal June completion date of the "group."

1	2	3	4	5	6
Normal Completion Year	# of Entering Enrollees	# of Graduates or Completions	Completion Rate (Col 3 ÷ Col 2)	# Employed in "Field or Related Field"	Employment Rate (Col 5 ÷ Col 2)
1967					
1968					
1969	71	45	63.38%		
1970	147	37	25.17%	35	23.81%
1971	111	68	61.26%	17	15.32%

13.0 Comparison of Output to Demand

Assume a continuation of the 1970 "employment rate" for the forecast period of five years (1970-1975).

Expan (225) + Replace (120) = $\frac{\text{Est Empl Output } (\ 175\ )}{\text{Est Demand } (\ 345\ )}$ = 50.72 %

Demand data source 2, page 126.

DATE January 11, 1972

SYSTEM [redacted]

ANALYST Wimer

DATA SOURCES #F/C 1-72

1.0 Population

Projected

Actual - Office of Program Planning and Fiscal Management, Information Systems Division, Population and Enrollment Section; State of Washington Population Trends - 1971; Olympia, Washington; January, 1972.

2.0 Work Force

Projected

Actual - State of Washington Pocket Data Book; 1970, Office of Program Planning and Fiscal Management, January, 1971; and telephone conversations with State Employment Security Department, Research and Statistics.

3.0 Employment Rate

Projected

Actual - Washington State Department of Employment Security; Thirty-Second Report - Statistical Supplement - July 1968 - June 1969; Olympia, Washington; December, 1969.

4.0 Percent of average Employment

4.1)
4.2) See Procedure #4.1, 4.2, 4.3
4.3)

4.4 See Procedures #4.5, 4.6

Occupations for which Community College training is appropriate.

4.5) See Procedure #3, steps 1 and 2
4.6)

5.0 Total Enrollment in Community College System (FTE-S Totals)

Projected - State Board for Community College Education; 1971 System Estimates of 1971-80 Enrollment.

Actual - State Board for Community College Education; Washington Community Colleges Report, No. 2, November, 1971, Fall Quarter Full-Time Equivalent Students (FTE-S).

6.0 Vocational Education Enrollment in Community College System

Potential - See Procedure #6.0

Projected -

Actual - Washington State Board for Community College Education; Washington Community Colleges Report, No. 2, November, 1971, Fall Quarter Full-Time Equivalent Occupational Students.

DATE January 11, 1972

SYSTEM [redacted]

ANALYST Wimer

DATA SOURCES #F/C 7.1A

1. Manpower Report to the President, April, 1971, page 203, Table A-1, Civilian Labor Force Employed.

2. Occupational Trends-Washington State, 1970-1975, October, 1971, Washington State Department of Employment Security.

3. Occupational Outlook Handbook, Bulletin #1650, 1970-1971 edition, U. S. Department of Labor, Bureau of Labor Statistics.

4. Occupational Manpower and Training Needs Bulletin #1701, U. S. Department of Labor.

5. Occupational Manpower Projections 1966-1968-1971, Washington State Employment Security Department.

6. Vocational Education and Occupations, July, 1969, U. S. Department of Health, Education and Welfare, Office of Education.

7. Tomorrow's Manpower Needs, Volume IV - The National Industry - Occupational Matrix and Other Manpower Data, Bulletin #1606, February, 1969, U. S. Department of Labor, Bureau of Labor Statistics.

8. The U. S. Economy in 1980, Bulletin #1673, U. S. Department of Labor, Bureau of Labor Statistics.

9. Washington State Department of Employment Security, Research and Statistics.

10. "Monthly Labor Review," April, 1970, U. S. Department of Labor, Bureau of Labor Statistics.

11. Tomorrow's Manpower Needs, Volume III - National Trends and Outlook: Occupational Employment, Bulletin #1606, February, 1969, U. S. Department of Labor, Bureau of Labor Statistics.

12. Labor Force and Employment in Washington State, Statewide and Selected Areas, Washington State Department of Employment Security, Research and Statistics.

13. "The Washington Labor Market," Washington State Department of Employment Security.

(more)

14. Washington State Department of Motor Vehicles, Real Estate Division, memorandum of March 23, 1972, from Jack Graham.

15. Occupational Outlook Handbook, 1966-67, Bulletin #1450.

16. Modern Vocational Trends Reference Handbook, 7th Edition, Juvenal L. Angel, Modern Vocational Trends Bureau, New York: Simon & Schuster, 1970.

17. Career Opportunities: Ecology, Conservation and Environmental Control, J. G. Ferguson Editorial Staff, Chicago: J. G. Ferguson Pub. Co., 1969.

18. Nonprofessional Occupations in Education: Their Implications for Priorities in Vocational Technical Education, Working Paper, Larkin, Paul; Teeple, John; Office of Education, Washington, D. C., Bureau of Research, 1969.

19. NEA Research Bulletin, May, 1967, National Education Association, Research Division, Washington, D. C.

DATE January 11, 1972

SYSTEM [redacted]

ANALYST Wimer

DATA SOURCES #F/C 7.1A

(Continued)

(H-1) Health Manpower Source Book, Section 21, Allied Health Manpower 1950-1980, U. S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health.

(H-2) Professional Nurses in Washington State, a comparison 1970-1969-1961-1957, June, 1971, Ilse J. Volinn, Ph.D.

(H-3) A Guide to Health Manpower Resources, 1970, Washington Planning and Community Affairs Agency and Washington Department of Social and Health Services.

(H-4) Questionnaire Study on Registered Nurses in the State of Washington, 1961, State Board for Vocational Education.

(H-5) Health Manpower Supply, November, 1971, Ilse J. Volinn, Ph.D., Washington Department of Social and Health Services.

(H-6) Health Manpower and Facilities, State of Washington, 1968, Health Planning Series No. 2, March, 1969, Washington State Planning and Community Affairs Agency.

(H-7) Attached letter from American Association for Inhalation Therapy.

(H-8) 1970 survey by Northwest Dental Laboratory Association (1627 Eastlake Avenue East, Seattle, Washington).

(T-1) "Monthly Labor Review," May, 1970, U.S. Department of Labor, Bureau of Labor Statistics.

(T-2) "Science Education News," October, 1971, American Association for the Advancement of Science.

(T-3) Attached informal survey of veterinarians in four regions, February, 1972.

DATE January 11, 1972

FIELD [redacted]

CODE (OE) [redacted]

SYSTEM [redacted]

ANALYST Wimer

DATA SOURCES #F/C 2-72

8.0 Enrollment in [redacted] field.

8.1 Total

Potential - 5.0 X 7.2

Projected - From official State Board for Community College projections.

Actual - OPES Data Collection Audit (Fall, 1971).

8.2 First Year

Projected - From official State Board for Community College projections.

Actual - OPES Data Collection Audit (Fall, 1971).

9.0 Graduates

Projected - From official State Board for Community College projections.

Actual - OPES Data Collection Audit; total number of graduates.

10.0 Employment

Projected - From official State Board for Community College projections.

Actual - OPES Data Collection Audit (Fall, 1971); latest count of the first year enrollees (graduates and nongraduates) who are employed in [redacted] or related occupation.