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A VALIDATION OF THE STATEWIDE COMPUTERIZED
MODEL FOR DETERMINING OCCUPATIONAL
OPPORTUNITIES IN NEBRASKA.

THE UNIVERSITY OF NEBRASKA - LINCOLN, PH.D.,
1978

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PREVIEW

A VALIDATION OF
THE STATEWIDE COMPUTERIZED MODEL
FOR DETERMINING OCCUPATIONAL OPPORTUNITIES
IN NEBRASKA

by

Elton B. Mendenhall

A DISSERTATION

Presented to the Faculty of
The Graduate College in the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy
Department of Secondary Education

Under the Supervision of Professor Ward Sybouts

Lincoln, Nebraska

December, 1978

TITLE

A VALIDATION OF THE STATEWIDE COMPUTERIZED MODEL

FOR DETERMINING OCCUPATIONAL OPPORTUNITIES IN NEBRASKA

BY

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ACKNOWLEDGEMENTS

The undertaking and completion of this research project was dependent upon the encouragement, cooperation, and assistance of many people. I would like to express appreciation to the many employers that contributed time and information to the study.

My sincere thanks to Dr. Ward Sybouts, chairman of my doctoral committee, and to Dr. Roy Dillon, Dr. Max Hansen, and Dr. Willis Moreland for their support and advice on completion of this project.

A special thank you is extended to the staff of the Nebraska Research Coordinating Unit for their advice and assistance with the project.

Many friends and colleagues have taken time in their lives to encourage and assist in ways too numerous to mention. To them I say thank you. I would like to thank Dr. Gerald Boardman for his understanding of this particular project and support in its completion. Special appreciation is extended to Beverly Meier for the editing and typing of the final manuscript.

Final words of appreciation are reserved for my wife, Ardy, for her support, encouragement, assistance, and involvement toward the completion of this study.

E.B.M.

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CHAPTER I

INTRODUCTION

BACKGROUND FOR THE STUDY

A rationale for vocational education as an example of social intervention in our society is documented by state and national legislation of this country. Vocational education intervened to provide specialized services to individuals relating to employment and training. Specific services of vocational education may be categorized as career counseling, pre-vocational training, occupational training and placement, and follow-up services. These services were related to the individual participants' ability and satisfaction in the world of work. Vocational education could be considered one of several pieces of legislation directed at employment training, all of which must rely upon curriculum, facilities, and programs to deliver their social service to individuals.¹

Federal and state governments were heavily involved in providing funds and guidelines for delivery of social intervention known as vocational education. State education agencies received federal funds to be administered on the basis of a statutorily required state plan. This plan was both a planning document and a reporting requirement of federal vocational education legislation. The 1963 Vocational Education Act and

¹Daniel H. Kruger, Occupational Preparation Programs: Implications For Vocational R & D, The Center for Vocational Education, Occasional Paper No. 31, (Columbus: The Ohio State University, 1971), p. 1.

the subsequent Amendment of 1968 established that vocational programs should be based upon manpower needs and job opportunities. Section 102.53 relating to manpower needs and job opportunities, stated:

In allocating funds among local educational agencies, the State board shall give due consideration to information regarding current and projected manpower needs and opportunities², particularly on the local, State, and national levels.

During the implementation period following the passage of the Vocational Education Legislation of 1963, each state developed a procedure for determining manpower needs and job opportunities in compliance with section 102.53 referred to above. Many of the Research Coordinating Units for Vocational Education across the nation became involved in the research to develop or identify manpower needs and job opportunities. This involvement was prompted by a memorandum issued by the U.S. Commissioner of Education to chief state school officers, executive officers of state boards of education, and state directors of vocational education. The memorandum invited state departments of education and universities to submit proposals for the establishment of state Research Coordinating Units. The invitation to submit proposals resulted in 24 states responding in 1965 and 20 additional responses in 1966.

Nebraska responded to the invitation via letter to David S. Bushnell, Director, Occupational Research and Planning Programs, Division of Vocational and Technical Education, U.S. Office of Education, Washington, D.C. The letter was an announcement of the intent to establish an

²Federal Register, State Vocational Education Programs, Volume 35, Number 91, Part II, Saturday, May 9, 1970, p. 7344.

Occupational Research Coordinating Unit at the University of Nebraska, at the request of the State Director of Vocational Education, Mr. Cecil Stanley. The letter was written to accompany a "Contractor's Proposal and/or Plan of Operation" (OE 5117 Rev 6-64) and was signed by James T. Horner. The proposal included appropriate signature, titles, budgets, and a brief statement of "work or service proposed" as follows:

To develop a coordination unit for facilitation of systematic collection, analysis, interpretation, and dissemination of local, state, and national occupational data to provide direction and dimensions for state and local programs of vocational technical education in Nebraska Schools; to explore the development of data processing procedures for the continual analysis of trends and projections of occupational opportunities and educational needs; to improve facilities for identifying shifts in employment structure and accompanying changes in occupational and education demands, as well as facilities for communicating information to state and local bodies to minimize lab time for their translation of data into relevant training programs.³

The acceptance of many proposals, similar to Nebraska's, by the U.S. Office of Education, was the beginning funding source of Research Coordinating Units (RCU's) across the nation.

Although responsibility for planning and administration of vocational education usually rested with state education agencies, many were not staffed to move into the field of occupational need projections. RCU's became one of the primary sources of occupational need data for vocational education planning. The role of the Nebraska RCU in both

³ James T. Horner and John K. Coster, "The Establishment and Development of a Research and Coordination Unit in the Area of Occupational Needs Research and Coordination in Nebraska" (unpublished proposal submitted to Department of Health, Education, and Welfare, Washington, D.C., 1965).

planning and occupational projection is documented in the Nebraska State Plan for the Administration of Vocational Education. A primary purpose of this study was the verification and validation of procedures used by the RCU for state level occupational projections.

The emergence of federal manpower programs of the 1960's brought renewed interest in the cost of social expenditure and involvement in the development of human skill and competence for employment. This interest was also responsible for efforts to bring administrative planning and implementation to a more effective level of development. During this process, many RCU's became an administrative arm of state education agencies rather than a research component of university structures.

Numerous problems of implementing manpower projection techniques at national and state levels are implied by statements of researchers in the late 1960's and early 1970's. Aronson's writings suggest that the absence of an adequate data base for newer and more innovative programs inhibited evaluation of various projection techniques. He also suggests that the lack of technical and administrative experience with manpower programs, at all governmental levels, contributed to the lack of evaluation designs for projection techniques. A major conclusion suggested in Aronson's book was that forecasting at the local level was not practically feasible; however, state, regional, and national level data could be used as controls in evaluating local needs.⁴

⁴Robert L. Aronson, The Localization of Federal Manpower Planning, ed. Robert L. Aronson (New York: Cornell University, 1973), p. 3.

Additional reasons for the lack of evaluation regarding manpower forecasting techniques were prompted by James Scoville's suggestion that "the current balance of legislative and executive opinion seems to emphasize planning and coordination while giving little or no attention to the problem of how these are to be done." He further reminds that the 1968 amendments to the Vocational Education Act stipulated that states produce detailed five-year plans based upon manpower forecasts left to the imagination of bewildered and understaffed administrators of vocational education.⁵ Regarding employer forecasts (known as Area Skill Surveys), Scoville states that:

Although there appears to be no comprehensive evaluation of these skill surveys, the evaluations that have been made seem to have revealed considerable error.⁶

Further support or concern for improving manpower projections was evident in the priority for research under Section 131 (a) of Part C of the Vocational Education Amendments of 1968 (P.L. 90-576). The priority established support for studies to improve manpower projections, match job requirements to skills of workers, translate manpower forecasts into program and curriculum requirements, and provide a basis for interfacing of vocational education with economic development groups. A review and synthesis of projects funded under this priority, by Allen Moore, suggested that the variety and variation of projects and techniques

⁵James G. Scoville, "The Role of Forecasting in Planning Manpower Programs," The Localization of Federal Manpower Planning, ed. Robert L. Aronson (New York: Cornell University, 1913), p. 51.

⁶Ibid., p. 54.

funded makes it impossible to suggest any evaluation variables common to all projects. Most of the projects seemed developmental and provided descriptions of certain information collected or manpower projections for specific regions or areas; however, validation of information accuracy was not described.⁷

In Nebraska, the first attempts to identify manpower needs and job opportunities for vocational programs, following the 1963 Vocational Education Act, were undertaken by the Nebraska Research Coordinating Unit for Vocational Education. Although this activity was carried out annually from 1968 through 1976 with only minor changes in methodology, the study was never validated on a formal basis. Additional impetus and support for an evaluation of the methodology used by the Nebraska RCU became urgent with passage of new vocational legislation in 1976. The Education Amendments of 1976 again supported and required identification of manpower projections for planning vocational programs. The specific charge of the new legislation relating to manpower projections was to:

Assess the current and future needs for job skills within the pertinent region of the country, through consideration of the latest available data of present and projected employment....⁸

⁷ Allen B. Moore, Manpower Information Systems, A Review and Synthesis of Information of FY 74 Projects Supported under Section 131 (a) of Part C of the Vocational Amendments of P.L. 90-576, The Center for Vocational Education (The Ohio State University, 1977), p. 6.

⁸ U.S. Congress, Education Amendments of 1976, Public Law 94-482 94th Congress, Title I Vocational Education, Part A, Section 107, 1976, p. 2180.

In view of the continuing importance of manpower projections to the administrative planning activities of vocational education, the following purposes for the study were identified. The purposes were:

1. to verify procedures used by the Nebraska RCU in forecasting occupational opportunities in Nebraska, and
2. to identify rates of error attributable to employer based manpower forecasts.

STATEMENT OF THE PROBLEM

The purpose of this study was to validate the procedures and determine the accuracy of what had become known as the Statewide Computerized Model for Determining Occupational Opportunities in Nebraska (NSCM). Specific objectives of the study were:

1. To validate procedures of data collection by resurvey of employer participants from 1973, 1974, and 1975.
2. To determine differences in projected employment need, as stated by employers, compared to actual employment collected through resurvey of employer participants from 1973, 1974, and 1975.
3. To determine projection error relating to Occupational Category, Occupational Group, and Occupational Title.
4. To determine project error relating to the Instructional Training Areas of agriculture, distributive, health, home economics, office, technology, trade and industry occupations.

HYPOTHESES

1. There is no significant difference between data collected by original employer interviews in 1973, 1974, 1975, and data verified by employer resurvey in 1976.

2. There is no significant difference between employers projected need, based upon interviews from 1973, 1974, 1975, and actual employment verified by resurvey in 1976 when grouped by DOT occupational category.
3. There is no significant difference between employers projected need, based upon interviews from 1973, 1974, 1975, and actual employment verified by resurvey in 1976 when grouped by DOT occupational groups.
4. There is no significant difference between employers projected need, based upon interviews from 1973, 1974, 1975, and actual employment verified by resurvey in 1976 when grouped by DOT occupational title.
5. There is no significant difference between projections for instructional training areas of agriculture, distributive, health, home economics, office, technology, trade and industry occupations based upon employer interviews in 1973, 1974, 1975, and need verified by employer resurvey in 1976.

ASSUMPTIONS

For purposes of this study, the following assumptions were made:

1. It was assumed that the area of Nebraska designated, the Southeast Technical Community College Area, by L.B. 759 was representative in occupational structure to the entire State. RCU records indicated that all nine major groups of the Dictionary of Occupational Titles (DOT) were represented in the occupational structure of the Southeast Technical Community College Area.
2. It was assumed that the occupations identified by employer survey between 1971 and 1976 were, in fact, a representative sample of occupational categories, occupational groups, and occupational titles existing in Nebraska.

The generalization of information from this study is related to the assumption that the Southeast Technical Community College Area is similar in occupational structure to the rest of the State. Comparisons of earlier survey data to data collected during resurvey could then be generalized to the entire State. Since the study sample was drawn from

a randomly selected population of state employer firms, which were originally drawn by random sample, and procedures for collecting original data were the same throughout the State, validation of these procedures during the resurvey would represent validation for the entire state.

SCOPE AND DELIMITATIONS

This study was concerned with the validation of procedures used by the Nebraska Research Coordinating Unit to gather data and to project occupational opportunities for Nebraska. The study involved the resurvey of employers that had been interviewed in previous years to determine employment and future need. A region of the State identified as the Southeast Technical Community College Area was selected as the resurvey area, due to its proximity to the offices of the Nebraska Research Coordinating Unit and for its similarity to the state in occupational structure. (RCU records indicated that all nine major Dictionary of Occupational Titles (DOT) groups were represented in the Southeast Technical Community College Area).

LIMITATIONS OF THE STUDY

1. The study was limited to a region of the State as funds for conducting employer resurvey were limited.
2. The study sample was limited to 30 percent due to cost and time constraints of the employer resurvey.
3. The study was limited to Nebraska during the time in which employer interviews were used to obtain information on employment and future employment needs.

OVERALL PLAN

The plan for this study was to conduct a resurvey of employers, within the Southeast Community College Area in order to determine if there was significant error in:

1. Original data as collected by personal interviews.
2. Projected employment need as estimated by employers during interviews in 1973, 1974, and 1975.
3. Projected employment need as presented by the Research Coordinating Unit when original interview data was aggregated by levels of occupational category, group, and title.⁹

A resurvey of employers using the original interview instrument and information would be used to verify original information and to collect current information. Comparisons of actual versus projected could then be made regarding employment categories, groups, and titles. Since all original data and interview forms had been retained by the RCU, the original instruments were determined the best method of collecting resurvey information. Resurvey information would be collected, coded, and processed in the same manner as the original employer interviews from 1973, 1974, and 1975.

⁹U.S. Department of Labor, Dictionary of Occupational Titles, (Volume 1, Third Edition), U.S. Government Printing Office, Washington, D.C., 1965.

CHAPTER II

REVIEW OF LITERATURE

INTRODUCTION

A review of research and professional literature relating to the issues and complexities of estimating employment needs for vocational program planning is presented in this chapter. The review is subdivided into the following sections: (1) historical background and legislation, (2) development of the Nebraska model, (3) manpower projection techniques in selected states, (4) manpower projection models, (5) evaluation techniques, (6) rationale for the study, and (7) summary.

This review of research and professional literature was conducted through the use of Dissertation Abstracts, Educational Resources Information Center (ERIC), microfiche from Love Library at the University of Nebraska, and extensive reports and research studies from the resource library of the Nebraska Research Coordinating Unit for Vocational Education. Additional selected studies were obtained from the Bureau of Labor Statistics, Department of Labor, Washington, D.C.; the Nebraska Department of Labor, Bureau of Employment Security; the Oklahoma and Kentucky RCU's; and the Nebraska Department of Education, Division of Vocational Education.

A preliminary review of research relating to manpower projections revealed very few studies that could conclude universally, the validity of employer estimates of employment need for use in vocational program planning. The review did reveal that estimating labor market supply

and demand is a difficult and risky task. There are many factors and variables that influence employment supply and demand information. These variables can change very rapidly and can be influenced by national, state, and local conditions of the employment market.

The fact that many variables influence labor market supply and demand may explain the shortage of information on the validity of employer estimates of need for vocational program planning. The literature does, however, reveal some of the complexities of projecting employment supply/demand characteristics. The literature also reveals a number of models used by other states to arrive at estimates of employment supply/demand characteristics.

HISTORICAL BACKGROUND LEGISLATION

The influence of federal legislation upon planning by recipient agencies of federal dollars can be traced in the records of legislation and subsequent regulations for administering federal and state programs. Many pieces of legislation require documentation of compliance by state level governing agencies. These compliance documents served as both planning and reporting verification when submitted to the federal agency by state level agencies.

Following World War II, federal legislation began a trend of commitment to planning for employment. This commitment was reflected in the Employment Act of 1946, which set forth government intent to maintain maximum employment. While the Manpower Development and Training Act of 1962 exemplified the government's concern in limited training and

education for needed skill areas, the 1963 Vocational Education Act further strengthened the commitment.¹ As the concept of full employment and the inclusion of education as an element of economic planning began during the late forties, an unprecedented interest in educational planning emerged. Studies by Ahamad and Blaug indicate that other spinoff characteristics also emerged as planning activities developed.

Within a decade or so, the rapidly growing literature on the subject developed its now characteristic economic bias, its emphasis on numbers rather than on the quality of education, and its controversial flavour dominated by a peculiar jargon.²

With interest upon manpower planning as a component of economic planning and human resources, Vocational Education entered the arena with renewed emphasis and a broadened scope of involvement. Kidder suggested that vocational education officials assumed that manpower forecasting constituted a natural part of their responsibilities. He contended that the officials were encouraged in this feeling by experts and the spirit of the laws, notably the Vocational Education Act of 1963 and its amendments of 1968.³

In his "Politics of Manpower Planning," Lovell contends that the 1960's evolved as a period of changing national priorities. His view

¹ Jacob J. Kaufman and John M. Sumansky, Manpower Planning Occupational Education and the Decision to Participate In the Labor Force (Center for Occupational Education DASP Technical Paper No. 2, North Carolina State University at Raleigh, 1974), p. 11.

² Bashir Ahamad and Mark Blaug (ed.), The Practice of Manpower Forecasting, (San Francisco: Jossey-Bass, Inc. 1973), p. 1.

³ David E. Kidder, Review and Synthesis of Research on Manpower Forecasting for Vocational Education, ERIC Clearinghouse on Vocational Technical Education, (Columbus: The Ohio State University, 1972), p. 3.

supports an evolving comprehensive manpower program with a framework for determining relative federal, state, and local responsibilities. He also suggested that a challenge for the future was to translate these responsibilities into a capable overall system of the future.⁴

Federal legislation of the 1970's renewed the emphasis for vocational education planning related to manpower forecasting. Public Law 94-482, known as the "Education Amendments of 1976," established a state occupational information coordinating committee charged with "implementing an occupational information system, in the state,...for planning and operating programs of the State board assisted under this Act..." Legislation also directed representative membership for the committee and directed coordination with other manpower legislation and governing agencies.⁵

Discussion of the role of forecasting as it relates to planning by Parnes indicates a strong support for the relationship in the following statement:

If planning may be conceived as a "process of preparing a set of decisions for action in the future directed at achieving goals by optional means," it must necessarily involve some guesses about what the future will be in the absence of intervention.⁶

⁴Malcolm R. Lovell, Jr., "The Politics of Manpower Planning," The Localization of Federal Manpower Planning, ed. Robert L. Aronson (Ithaca: Cornell University, 1973), p. 14.

⁵U.S. Congress, Education Amendments of 1976, Public Law 94-482, 94th Congress, Title I Vocational Education, Part B, Section 161, (1976), p. 2199.

⁶Herbert S. Parnes, "Discussion," The Localization of Federal Manpower Planning, ed. Robert L. Aronson (Ithaca: Cornell University, 1973), p. 62.

Certainly, the role of manpower forecasting is established by federal legislation as a component of vocational education administration. The emergence of more sophisticated procedures and techniques in forecasting may well lead to better forecasts in the future. In order to prepare to advance into the future, validity of past efforts must be documented.

DEVELOPMENT OF THE STATEWIDE COMPUTERIZED MODEL
FOR DETERMINING OCCUPATIONAL OPPORTUNITIES IN NEBRASKA

Nebraska established its intent to become involved in developing manpower information with its response to a memorandum issued by the U.S. Commissioner of Education in 1965. The memorandum invited states to establish Research Coordinating Units (RCU's) and resulted in the some 24 successful applicants in 1965. Nebraska was one of the states selected to begin operation in 1965. A subsequent proposal submitted in 1966 was designed to maintain the responsibility for identifying occupational opportunities data. The Research Coordinating Unit for Vocational Education maintained the responsibility for preparing occupational opportunities data through annual publications which began in 1965. Some of the administrative details of the project changed in 1968 as the funding responsibility was transferred from the U.S. Office of Education to the Nebraska State Board of Vocational Education. The projects approved by the State Board of Vocational Education include the following purposes:

- A. To compile and update a master population of all firms in the state which employ one or more persons

- B. To make a minimum random sample of five percent from the master list of firms
- C. To obtain job descriptions from each firm in the sample via personal interview
- D. To classify job descriptions collected from employer interviews using the Dictionary of Occupational Titles as a major reference system
- E. To convert classified job titles (employer data) to corresponding vocational instructional programs using the Vocational Education and Occupations document published by the U.S. Office of Education, and
- F. To present the report in a format similar to the 1975 Report of the Occupational Opportunities in Nebraska, and useable to those persons concerned with planning and administering vocational education programs, as well as persons involved with career planning and selection.

Although the purposes for the RCU study remained the same over the years, some changes were made in procedures for collecting and coding information on employer needs. The original data gathering activity beginning in 1967 used a questionnaire, mailed to employers, to collect employer information regarding current employment, projected needs, and reason for needs by turnover, retirement, promotion, and expansion. A copy of the original mail out form is found in Appendix A. The mail out questionnaire proved unsatisfactory due to the error factor introduced by employer interpretation of job titles relationship to instructional training programs. The following year (1968), a personal interview technique was developed using basically the same questionnaire that had been mailed to employers the previous year. The use of personal interviewers

⁷ Nebraska Department of Education, "Statewide Computerized Model for Determining Occupational Opportunities in Nebraska, 1976 Report" (unpublished project proposal approved by the Nebraska State Board of Vocational Education, 1975).