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ABSTRACT

This annotated bibliography is addressed to problems of education personnel demand and supply in the United States. Some entries, seemingly dealing with other professions, have been included as relevant to education personnel. The general criteria used to determine the types of articles included in the bibliography are (a) all studies dealing with demand for and supply of education personnel, at the elementary, secondary, and higher education level; (b) selected articles including quantitative estimates and associated methodologies for assessing imbalances in the demand for and supply of individuals in other professional occupations; and (c) studies of the effects of various policies concerned with alleviating imbalances in the demand for and supply of education personnel. Information regarding nontechnical and technical personnel are categorized according to demand and supply of education personnel, demand and supply of general professional personnel, and policy impact studies. The time frame for most of the articles included in the bibliography is 1970-73. (MJM)

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A BIBLIOGRAPHY OF
DEMAND AND SUPPLY OF EDUCATION PERSONNEL

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FOREWORD

In 1971 the national enrollment in education institutions registered an increase for the 27th consecutive year. Since that date, however, the supply and demand balances have become mixed, with shortages of education personnel in some fields of study, educational levels, and geographic areas and at the same time a national oversupply. In the coming years of this decade both the supply and demand situations will, in all likelihood, continue to be complex. Fortunately, there are a number of studies which contain information of value to students, education institutions, and governmental institutions at all levels. Through this publication the National Center for Education Statistics (NCES) seeks to provide ready access to these studies which are found in a wide variety of sources.

The compilation of this annotated bibliography was conducted under the supervision of Alvin M. Cruze of the Research Triangle Institute with the assistance of Stephen A. Johnston, Frank L. Raiter, Hazel Jolley, and Linda Froyen, with support from NCES.

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INTRODUCTION

All entries included in this bibliography are addressed to problems of education personnel demand and supply in the United States. Entries seemingly dealing with other professions have been included as relevant to education personnel, the central concern of this bibliography.

The general criteria used to determine the types of articles included in the bibliography are: (1) all studies dealing with demand for and supply of education personnel, at the elementary, secondary, and higher education levels; (2) selected articles including quantitative estimates and associated methodologies for assessing imbalances in the demand for and supply of individuals in other professional occupations; and (3) studies of the effects of various policies concerned with alleviating imbalances in the demand for and supply of education personnel.

The timeframe for most of the articles included in the bibliography is from 1970 through 1973, as they are most likely to address the problem of potential surplus of education personnel in the 1970's. However, particularly significant articles published earlier have been included in the bibliography.

Numerous sources of articles and studies were employed in preparing this bibliography. These included: the monthly index published by the Educational Resources Information Center (ERIC); the Journal of Economic Literature; publications of the various U.S. Government agencies, including the Office of Education, the Department of Labor, and the Bureau of the Census; and the publications of the National Education Association. Additional documents were identified from a variety of miscellaneous sources. For documents obtained from the ERIC index, the ERIC accession number is provided in the annotation.

ORGANIZATION OF MATERIALS

Although several articles contain materials relevant to more than one category, each is classified according to its primary thrust and no cross classifications are provided. Definitions of the categories in which the materials are organized follow:

EDUCATION PERSONNEL

Nontechnical

Nontechnical articles are those that are descriptive in nature, that contain only a summary of findings and conclusions without an accompanying methodological discussion, or those that present only data.

Technical

Articles included in the technical category are those that contain materials related to the methodological or analytical approach used to develop findings and conclusions.

GENERAL PROFESSIONAL PERSONNEL

The general professional personnel category includes articles concerned with all professions, including education, as well as specific noneducation professions.

POLICY IMPACT STUDIES

Although several studies derive policy implications of their results, only the two studies classified in the policy impact studies category present the estimated effects of policy shifts in their results.

SELECTED ANNOTATED BIBLIOGRAPHY

DEMAND AND SUPPLY OF EDUCATION PERSONNEL

Nontechnical

1. Bombach, Gottfried. "Manpower Forecasting and Education Policy," Sociology of Education. Vol. 38, No. 5 (fall 1965), pp. 343-374.

This paper deals with methods of manpower forecasting in relation to economic growth with the aim of providing tools for education policy purposes. It is concerned with the interdependence between the educational structure of manpower as derived from economic growth and the output of the educational system. The paper advocates the idea of manpower forecasting as an instrument of education policy and explains two of its basic aspects: (1) the philosophy behind the concept, (2) the methods of analysis and forecasting.

2. Brown, David G. The Market for College Teachers. Chapel Hill: University of North Carolina Press, 1965.

The primary purpose of the analysis of the labor market of professional teaching and research services is to increase the understanding of how and why workers move among jobs in order to improve the allocation of scarce manpower. Questionnaires were sent to 103 new faculty members and 50 department chairmen in the Southeast. The book answers such questions as: What are the channels of communication in academic labor markets? What are the characteristics of the supply of college professors? What are the sources of imperfection in labor markets? Do these imperfections cause a misallocation of teaching manpower?

3. Burtnett, Francis E. "Working Around the Teacher Surplus: Other Careers in Education," Occupational Outlook Quarterly. Spring 1972, pp. 6-9

Current and projected manpower needs show a variety of rewarding opportunities in the field of education despite a current teacher surplus. A brief introduction to a cross section of promising careers in this field is provided.

4. Byrnes, James C., and Tussing, A. Dale. The Financial Crisis in Higher Education: Past, Present, and Future. Syracuse University Research Corporation Report No. EPRC-RR-6. Syracuse, N. Y.: EPRC Publications, December 1971. ERIC ED 061 896.

American higher education, according to the authors, is facing a financial crisis that can be alleviated only by drastic, increased Federal support to the education system. Presented in this document is a review of the financial history of American colleges and universities, a look at the present situation, and a preview of the future picture of higher education. Following the past, present, and future review is a discussion of whether a Federal role in financing is implied, how much aid should be appropriated, and what form this aid should take. It is suggested that the Federal Government adopt a financial aid program that would combine institutional and student aid. An institutional grant and student loan program is offered as one major alternative.

5. Carter, Donald E., and McCowan, Richard J. Relevant Variables in Teacher Supply and Demand. Buffalo: State University of New York, Educational Research and Development Complex, December 1970.

The shortage of teachers has been discussed for years as a crucial problem. In 1969, the National Education Association estimated that the teacher shortage was 224,200 when a minimum quality criterion was considered. Despite this apparent shortage of "qualified" teachers, decreases in the number of births and increases in the number of college graduate education majors reveal a trend toward a surplus of available teachers. In view of this problem, it is recommended that programs to prepare junior and community college teachers be expanded, that emphasis be shifted from preparing new teachers to improving the competencies of inservice teachers, that admission standards for teacher education programs be modified, and that student advisers at both the high school and college level become more familiar with trends in the demand for manpower.

6. Cartter, Allan M. "Faculty Needs and Resources in American Higher Education," The Annals of the American Academy of Political and Social Science. Vol. 404 (November 1972), pp. 71-87.

The stock of doctorates in the United States is currently growing at nearly 9 percent per year. The rate appears even higher when combined with the slowdown in research and development and the expected decline in growth of college enrollment. After 1975 the demand for new teachers with doctorates is likely to drop from 15,000 annually to close to zero in 1984-88.

7. _____ . "Scientific Manpower 1970 - 1985," Science. Vol. 172, No. 3979 (April 9, 1969), pp. 132-140.

One point of this paper is that a surplus of doctoral scientists cannot be fully blamed on the cutback in Federal funds. The conclusion is that a graduate education and research establishment in American universities has been created and is 30 to 50 percent more extensive than can be effectively used. The author states that now, forewarned, the Nation should look inward and reassess institutions to avoid an even worse crisis in the years 1978 to 1990.

8. Dewitt, Laurence B., and Tussing, A. Dale. The Supply and Demand for Graduates of Higher Education: 1970 to 1980. Syracuse, N.Y.: Syracuse University Research Corporation, 1972

A topical study of the job opportunities for college graduates in the decade of the 1970's. Areas discussed include the impact of recessions on the academic community, unemployment and underemployment of graduates, timelags in response to supply and demand disequilibria, projections of skilled manpower surpluses, and alternative uses of college-age years. The study results indicate that there appears to be no particular danger of a fundamental surplus of B.A.'s in the 1970's, while there does appear to be reason to suspect an overproduction of Ph.D.'s and elementary and secondary school teachers. An informed Federal policy directed at ameliorating this surplus would have to be based upon some knowledge of the strength and effectiveness of non-Federal sources of adjustment of supply and demand. A course of manpower planning, based on further data collection, is recommended as an attempt to alleviate the problems of oversupply, unemployment, and underemployment.

9. Glenny, Lyman. Doctoral Planning for the 1970's. Berkeley: University of California, Center for Research and Development in Higher Education, 1971. ERIC ED 049 706.

The launching of the U.S.S.R.'s sputnik in 1957 caused a reassessment of scientific manpower needs in the United States and drastic shortages of all types of highly trained specialists were predicted by 1970. This myth continued until the late 1960's, when proposals were still being made to double Federal aid for graduate students. Federal aid induced State colleges to embark upon advanced graduate work, and national production of doctorates almost tripled from 1958 to 1969 from 8,942 to 25,734. It is now obvious that in the foreseeable future the excess of doctorates over established needs will be substantial. Five closely interrelated problems are now facing public and private institutions and the States: (1) underwriting the costs, (2) reducing the anticipated surplus production, (3) maintaining the quality of the degree, (4) changing the character of some

doctoral degree training, and (5) absorbing surplus doctorate holders. There is need for a careful assessment of basic needs and a careful allocation of resources to meet them.

10. Greenfield, Phyllis O. Staffing Patterns in American Education, 1973. Silver Spring, Md.: Applied Management Sciences, Inc., 1973. ERIC ED 077 866.

This is a report of a survey of the supply and demand patterns of education personnel in the United States in 1973. Current trends for the different levels and specializations of educational practices, including pupil personnel services, are tabulated as to current needs (charts are included in the text). There are also comparisons of current trends to the trends of 1972 and geographic breakdowns of results, though States are not listed individually as to needs.

11. Howe, Trevor G. "Teacher Supply and Demand Study for Iowa." Paper presented at the American Association of Colleges for Teacher Education Annual Meeting, Chicago, Ill., February 1972. ERIC ED 059 979

This survey investigated problems of teacher supply and demand and collected information from local school districts to be used as base-line data on the current employment of teachers. Iowa's 452 school districts comprised the total sample for the empirical data given.

12. Huther, John W. "Small Market for Ph.D.'s," AAUP Bulletin. Vol. 58, No. 1 (spring 1972), pp. 17-20.

Since the question is no longer whether there will be a surplus of Ph.D.'s but how large the surplus will be, many people are looking to the public 2-year college to start hiring Ph.D.'s. It is assumed that a Ph.D. faculty is desirable in these institutions, but the author would disagree. In numerous surveys it was found that only 6 to 7 percent of the faculty of 2-year colleges have a doctorate. A special doctoral program for faculty at these institutions is suggested.

13. Hyde, Lewis H. "The Supply and Demand for School Teachers in Connecticut." Connecticut Conference of Independent Colleges, April 1974.

By studying projected birth rates and projected new degrees in education, the author reaches the following conclusions: the sudden, recent reduction in the birth rate, following an earlier reduction in 1964-65, makes it clear that school enrollment will shrink

steadily for at least the next 15 years. Demand for teachers will decrease from about 2,300 per year at present to about 1,300 per year by 1980-81. Connecticut is now producing about 5,000 to 6,000 new teachers each year, and many who qualified in previous years are competing for the same jobs. Even the most vigorous cutbacks are unlikely to bring supply and demand into balance.

14. Ihnen, Loren A., and Carroll, Adger B. Regional Conference on Supply and Demand for Teachers of Occupational Education in the South. Center Seminar and Conference Report No. 4. Raleigh: North Carolina State University, Center for Occupational Education, 1966.

A collection of five papers dealing with occupational education personnel, which present an overview of the general state of knowledge regarding the supply of and demand for teachers, particularly occupational education teachers in the South. Paper I is a description and analysis of the institutions and institutional arrangements which affect the demand for occupational education personnel. Paper II deals with problems of supply, particularly the need for increasing the quality of teachers and jointly the requirement to compete with industry for these personnel by offering competitive salaries and benefits. Paper III covers aspects of both supply and demand for teachers in general, and occupational education teachers specifically, while also discussing teacher quality. Paper IV deals specifically with methods to improve occupational education teacher placement and recruitment. Paper V deals with various approaches to planning, both to meet the requirements of industry and the requirement for qualified teaching personnel.

15. Indiana State University. "Teacher Supply/Demand: How Preparation Affects Employment Opportunities for Teachers in Today's Job Market." Terre Haute: Indiana State University, 1970. ERIC ED 045 556.

An analysis of the job market for teachers indicates that the average candidate's ability to find a job will be influenced by his geographic preference and his subject-area specialization. Geographically, the greatest opportunity is in the areas of high population concentration. Certain subjects, such as science and mathematics, have a high demand for teachers; but in other subjects, prospective teachers should improve their chances by broadening their competencies and obtaining certification in several areas.

16. National Board on Graduate Education. "Doctorate Manpower Forecasts and Policy." Washington, D.C.: National Board on Graduate Education, 1973.

This report concludes that useful, timely information on doctoral production and employment is not available and, thus, analysis of the doctoral labor force and the job market leaves much to be desired.

The Board examined three market phenomena: (1) academic demand, (2) nonacademic demand, and (3) supply. It concluded that it could have confidence only in the category of academic demand because of the strong influence of demographic factors. Constantly diminishing academic demand is foreseen for almost all fields throughout at least the 1980's.

17. National Education Association. A Critical National Problem: Underutilization of Teachers and Other College Trained Personnel. Washington, D.C.: February 1972. ERIC ED 059 981.

The major thesis of this document is that the supply of young manpower is growing at a record rate, the number of jobs is not growing as rapidly as a few years ago, and this situation is more critical for college educated manpower than for workers who have not attended college. Tables illustrate, with figures since 1960, the growth of the labor force, male graduates receiving bachelor's and first professional degrees, the number of unemployed, employment trends, employment offers to college graduates, and the unemployment of white and nonwhite males age 20-24.

18. National Education Association, Research Division. Biennial Salary Survey of Public-School Professional Personnel, Vol. I. Biennial Report, 1972-73. Washington, D.C.: National Education Association.

This report is a study of the salaries paid full-time professional staff members of public school systems. This volume deals with teachers and other instructional members of the staff. National estimates of mean and median salaries and detailed system-by-system information in systems of 12,000 or more are given. A representative sample of school systems with less than 12,000 enrolled is also included.

19. Economic Status of the Teaching Profession. Annual Report, 1972-73. Washington, D.C.: National Education Association.

Section I is concerned with trends in data which measure the condition of the national economy. Section II deals with salaries paid and scheduled for teachers in public schools, junior colleges, and degree-granting colleges and universities. Section III compares the earnings of teachers with the earnings of other professionals. Section IV provides information on family and household incomes for arriving at a fair earnings scale for the teaching profession. Section V compares hourly and weekly earnings of teachers and other workers. It includes comparisons of earnings of union and nonunion employees for selected occupational groups.

20. . Estimates of School Statistics. Annual Report. Washington, D.C.: National Education Association.

This annual report presents public school statistics for the 50 States, the District of Columbia, and outlying areas under U.S. jurisdiction. The text presents national data for each of the past 10 years and defines the basic series of statistics. The tables present revised estimates by State and region for the previous year and preliminary estimates for the current year.

21. . Evaluation of Teacher Salary Schedules, 1966-1967, 1967-1968, and 1968-1969. Washington, D.C.: National Education Association, 1968.

This report presents the evaluation scores for salary schedules of individual school systems. The evaluation indicates how well salary schedules measure up to the best accepted practice of scheduling, not only in dollar amounts scheduled, but also in the structural procedures involving the number and relative size of increments, adequate recognition of advanced participation levels, and other important aspects of scheduling.

22. . Ranking of the States. Annual Report. Washington, D.C.: National Education Association.

This report contains 128 ranked lists of State data. Some figures used are estimated, some are based on sampling studies. For this reason, conclusions based on slight differences among States in ranking on specific items should not be made. State school systems are ranked according to population, enrollment, teachers, educational attainment, attendance, revenue, expenditures, and debts.

23. . Salaries Paid and Salary-Related Practices in Higher Education, 1971-72. Biennial Report. Washington, D.C.: National Education Association.

This biennial survey of salary conditions in higher education identifies the status and trends of salaries and related practices among the various types of institutions of higher education. Areas covered include: (1) for 4-year institutions (colleges and universities)--

salaries of instructional personnel, salary-related policies, selected staffing practices, summer session practices, and salaries paid to administrative officers; (2) for 2-year institutions-- salaries paid to instructional personnel, salary-related policies, selected staffing practices, summer employment opportunities, and salaries paid to administrative officers.

24. Salary Schedules for Teachers. Annual Report. Washington, D.C.: National Education Association, 1972-73.

This report gives information on salary schedules for teachers in reporting school systems with enrollments of 6,000 or more, and for selected systems in high-income suburban areas with enrollments of 1,000 or more. The listing gives minimum and maximum scheduled salaries by preparation level, number of increments, and maximum placement for experience. Summaries of means, medians, and administrative provisions such as recognition of prior service, merit provisions, and index scheduling delineate the current nationwide status of teacher pay scales. Trends in mean, minimum, and maximum scheduled salaries are given to show the progress being made toward adequately compensating teachers.

25. Teacher Supply and Demand in Public Schools. Annual Report. Washington, D.C.: National Education Association, 1973.

This report provides two estimates of the demand for new teachers: one based on achievement of minimum quality in educational staffing and the other based on trends toward improvement in the quality of the teaching staff. Also, the study continues to estimate the demand for beginning teachers as a subgroup of the demand for new teachers. Two special surveys designed to identify the status of teacher supply and demand in various types of school systems and a review of the conditions influencing teacher supply and demand are also included.

26. _____ . "Trends in Teacher Supply and Demand in Public Schools, 1973-76," by William S. Graybeal. Washington, D.C.: National Education Association, June 1973. Research Memo No. 1973-8. ERIC ED 079 280.

This research report contains a descriptive analysis of tables on present and projected statistics of teacher supply and demand in the United States. Included are tables on enrollment in teacher education in 67 institutions, 1969-70 to 1972-73, by level; on graduates prepared to teach and graduates receiving bachelor's and first-professional degrees, 1968 to 1972 and projections to 1976; and on the projected supply and demand for beginning teachers in public schools, 1972 to 1976.

27. Olson, Paul A. (ed.) Education for 1984 and After. Study Commission on Undergraduate Education and Education of Teachers, 1971. ERIC ED 061 149

The document presents informed opinion on a variety of issues relevant to preparing education personnel. Sections of the study deal with (1) the assessment of community needs and the role of educational institutions in that community, (2) the fulfillment of educational responsibilities by the study committee on a noncompensatory basis, (3) the need to develop and respect cultural pluralism, (4) the need for further study in the area of credentials, (5) the creation of formats to assure access to the teaching profession regardless of background, differences, or culture, (6) the definition of a positive process to upgrade teacher standards, and (7) development of a management system which will create the opportunity to relate schools of education with schools of arts and science in ways which will not permit a division of responsibility.

28. Padilla, Arthur. "Manpower and Womanpower Planning - Theory and Application," Reformation and Reallocation in Higher Education, Clifford T. Stewart (ed.), Claremont, Calif.: Claremont University Center, 1972, pp. 77-82.

This paper describes various manpower planning tools and their relative effectiveness as related to higher education. Three planning methods are analyzed: the rate of return approach, the manpower requirements approach, and the demographic-economic method, with a brief example of application of the latter. The discussion concentrates on the relative merits and weaknesses of manpower projection methods and on their usefulness in higher education planning problems.

29. Parnes, H. S. "Manpower Analysis in Education Planning," Economics of Education, M. Blaug (ed.) Vol. 1. London: Penguin Books, 1971.

The paper explores the role and limitations of manpower forecasting in educational planning, presents a manpower requirements approach to

estimating a society's needs for education, and discusses some methodological aspects of manpower analysis. The limits, both ideological and practical, of manpower forecasting are discussed, and it is concluded that such forecasting is necessary and possible. Next, the manpower requirements approach is outlined as the best method for manpower forecasting.

30. Recruitment Leadership and Training Institute. "Teacher Shortage or Surplus: That is the Question." Philadelphia, Pa.: Recruitment Leadership and Training Institute, June 1972. ERIC ED 073 053

This paper discusses the question of teacher shortage or surplus and related issues. Informal surveys were conducted by the Recruitment Leadership and Training Institute (LTI) and other major educational organizations to provide a factual basis for the study. A review of the surveys conducted by LTI and a summary of published papers are presented. A chart depicting supply and demand for beginning teachers in public schools from 1952 to 1971 and projected to 1980 is included.

31. Regier, Herold G. Too Many Teachers: Fact or Fiction? Fastback Series, No. 5. Bloomington, Ind.: Phi Delta Kappa Educational Foundation, 1972. ERIC ED 063 640

The National Education Association reports that a gross oversupply of teachers currently exists and is likely to become worse in the future. This publication attempts (1) to assess teacher supply and demand, (2) look at related conditions that have influenced this situation, and (3) make suggestions for changes.

32. Shell, Helene I. Enrollment Trends in Higher Education: Research Currents. Washington, D.C.: American Association for Higher Education, June 1973. ERIC ED 076 175

Over the past several decades, colleges and universities have been experiencing vastly increasing enrollments that have caused institutions to expand programs and facilities to accommodate great numbers of students. Such expansion requires careful planning on the part of higher education administrators and accurate prediction as to the actual numbers and types of students attending their institutions. Such planning and accuracy of prediction has not been the case, however, as many institutions have now expanded their programs beyond financial means and student demand. Private colleges and universities are in particular trouble as they strive to compete with the State-supported universities' low tuition fees. This paper examines enrollment trends of the recent past to the present, considers some of the effects of these trends, and investigates how some institutions cope with problems that arise from enrollment fluctuations.

33. U.S. Bureau of the Census. Social and Economic Characteristics of Students, October 1972. Current Population Reports, Series P-20, No. 260. Washington, D.C.: U.S. Government Printing Office, 1974.

This report presents new information on recent changes in rates of school participation in the United States by age, sex, marital status, race, income, and change in the field of study of college students. Information is also presented on the enrollment status of persons 35 years old and over. The information presented in this report was derived from a supplement to the Census Bureau's October 1972 Current Population Survey and refers to the civilian noninstitutional population in the United States.

34. U.S. Department of Health, Education, and Welfare, Office of Education. Digest of Educational Statistics, 1973. Annual Report. Washington, D.C.: U.S. Government Printing Office.

This publication contains information on a variety of subjects within the field of education statistics, including the number of schools and colleges, enrollments, teachers, graduates, educational attainment, finances, Federal funds for education, libraries, international education, and research and development activities.

35. _____. Selected Statistics on Educational Personnel, by Leslie J. Silverman and A. Stafford Metz. Washington, D.C.: U.S. Government Printing Office, 1970.

Statistical survey (1956-67) of existing data on education personnel. Text highlights information presented in the 66 statistical tables.

36. _____. Statistics of Public Elementary and Secondary Day Schools, Fall 1972. Annual Report, by Betty Foster. Washington, D.C.: U.S. Government Printing Office, 1973.

This report is eighteenth in the annual series of fall statistics collected by the U.S. Department of Health, Education, and Welfare, Office of Education, on public elementary and secondary day schools data collected from classroom teachers on total and noninstructional staff. The report also provides information on local districts, pupils, high school graduates, instruction rooms, schools, estimated expenditures, and average salaries. Data are given for the 50 States, the District of Columbia, and, to the extent available, American Samoa, the Canal Zone, Guam, Puerto Rico, and the Virgin Islands. Includes information on the school systems serving the 20 largest cities (by population size) in 1970.

37. Teacher Turnover in Public Schools, Fall 1968 to Fall 1969, by Howard L. Fleischman and A. Stafford Metz. Washington, D.C.: U.S. Government Printing Office, 1974.

This report answers questions on how many teachers in public schools in fall 1968 no longer taught in the same school in fall 1969, and what kinds of schools had large proportions of the teaching staff leaving. To gather the data for the report, a survey of 1,205 public schools was taken in spring 1970. The population of public schools sampled was stratified by three characteristics: school level, location, and enrollment size. The survey represented 81,000 schools in districts with enrollments of 300 or more.

38. The Education Professions, 1971-72, Part I: The Need for Teachers in Our Schools and Colleges. Washington, D.C.: U.S. Government Printing Office, 1972.

This report explores the nature of the teacher surplus in institutions of higher education and in the elementary and secondary schools. Rather than view the issues solely in quantitative terms, the qualitative side of the problem of an adequate supply of teachers is emphasized. Because there are no qualitative national norms, the "shortage" or "surplus" of teachers can only be measured against the standards and norms of individual school districts and institutions. Chapter 1 analyzes the alleged "Ph.D. glut" in postsecondary institutions and attempts to examine the job prospects in these institutions in the 1970's and to examine the policy issues involved in the preparation and hiring of teachers. Chapter 2 is a case study of 10 school districts of differing sizes and localities serving quite different communities. Chapter 3 is a regional analysis of the supply of and demand for teachers for 1969, using data from the USOE Staffing Survey of 4,000 elementary and secondary schools. Chapter 4 sets forth the Office of Education's program priorities for 1973. The Appendix summarizes the programs of previous years.

39. The Education Professions, 1971-72, Part II: Differentiated Staffing, A State of the Art Report. Washington, D.C.: U.S. Government Printing Office, 1972.

The purpose of this report is threefold: (1) to define clearly the concept of differentiated staffing, (2) to relate the results observed by the schools which have experimented with it, and (3) to state some conclusions about the present state of the art and what the next steps should be. The results of 24 experimental projects suggest that staff differentiation can lead to an educational climate which will encourage changes that should improve the conditions of teaching and learning and have a significant impact on the students themselves.

40. _____. Trends in Post-Secondary Education. Washington, D.C.: U.S. Government Printing Office, October 1970.

A collection of 12 papers commissioned by the Bureau of Higher Education. The studies are divided into two groups, Part I deals principally with problems relating to students. Part II contains studies which are concerned with institutional problems and capabilities for expanding educational opportunity. Topics covered by the study include: (1) the student decision process regarding postsecondary education; (2) an examination of financial barriers to college attendance; (3) an examination of State efforts to remove financial barriers to postsecondary education; (4) the importance of relevance in expanding postsecondary education; (5) trends in secondary school vocational education which are likely to affect postsecondary education demands; (6) financing of higher education, with projections for 1975-76; (7) the role of the junior college in providing postsecondary education for all; (8) forecast of the supply of and demand for faculty in higher education to 1975-85; (9) faculty resources for universal higher education; (10) the outlook for adequate faculty in public postsecondary vocational education; (11) public postsecondary occupational education in the United States; (12) private vocational schools and their emerging role in postsecondary education.

41. U.S. Department of Labor, Bureau of Labor Statistics. "Library Manpower - A Study of Requirements and Supply, a Chart Presentation and Selected Study Highlights," (mimeographed). January 1974.

Includes charts comparing school, public, and academic libraries; male and female librarians in number and salaries; and comparisons of librarians by age and race. Projection charts for 1970-85 are given. The demand for and supply of librarians are projected. It is concluded that there will be fewer job opportunities in the 1970's, but the situation will ease slightly in the 1980's.

42. U.S. General Accounting Office. "Supply and Demand Conditions for Teachers and Implications for Federal Programs." Report to the Congress by the Comptroller General of the United States. Washington, D.C.: U.S. General Accounting Office, March 1974.

The General Accounting Office reported three conditions affecting Federal assistance programs which in turn were contributing to teacher surpluses: (1) the lack of a central information source, (2) a lack of information on the effect of Federal programs on new teacher supply, and (3) the unavailability of complete and consistent data about supply and demand conditions within the teaching and other professions. Recommendations to overcome these deficiencies are provided.

Technical

43. Blaug, M. "An Economic Interpretation of the Private Demand for Education." Economica. Vol. XXXIII, No. 130. (1966), pp. 166-182.

Demand for education is analyzed as an investment good. As such, it must be seen as a derived demand depending on the demand and supply functions of educated manpower in the labor market. It concludes that misleading results are likely if higher education enrollment projections ignore earning patterns in the labor market or manpower projections fail to consider whether the additional supply of educated manpower can be absorbed into employment.

44. Bolt, R. H., Koltun, W. L., and Levine, O. H. "Doctoral Feedback Into Higher Education," Science. Vol. 148, No. 3672 (May 14, 1965).

A feedback model is presented as a tool for policymakers. The problem addressed is that of the relations among numbers of academic degrees awarded and numbers of persons engaged in educating and training the degree recipients. The results from dynamically analyzing the model may be graphed, depicting alternative policies from a point of existing conditions to a curve of possible future conditions.

45. Carroll, Adger B., and Ihnen, Loren A. A Study of Supply and Demand for High School Teachers in Three Southeastern States. Center Research Monograph No. 5. Raleigh: North Carolina State University, Center for Occupational Education, 1972.

This quantitatively documented study uses data collected from North Carolina, Georgia, and Tennessee. A model of the market for the services of occupational education teachers is developed, as well as definitions of the supply and demand relationships involved in occupational education planning. The study seeks to measure these relationships as they operate in the model. The results suggest that economic variables are important in developing models for the demand and supply of teaching services in occupational education. They also indicate the difficulty involved in measuring supply and demand.

46. Cartter, Allan M. "The Supply and Demand for College Teachers," Journal of Human Resources. Vol. I, No. 1 (winter 1966), pp. 22-38.

This paper summarizes the events within the field of education of college teachers for the period 1956-66, and presents a growth model for projecting supply and demand conditions to 1985. Historical data on college enrollment and doctoral production are presented for 1953-64, and annual projections to 1985 developed by the author are listed. The model also shows implications for future levels of academic salaries. The author concludes that the situation is not as bad as many

educators suggest and that the current shortage should be alleviated in the early 1970's.

47. Cohen, Elchanan. The Economics of Education. Lexington, Mass., Toronto, and London: D. C. Heath, 1972.

After surveying early doctrines on human capital, a discussion linking education to economic growth is taken up. Other topics included are theoretical analysis of costs, benefits of education, profitability of education, survey of educational input-output studies, teachers' salaries, and financing of education.

48. Eckaus, R.S. "Economic Criteria for Education and Training," Review of Economics and Statistics. Vol. 46 (May 1964), pp. 181-190.

This paper presents a criticism of the use of the rate of return criteria in making educational decisions. The first section evaluates the working of the "price system" in education and the usefulness of criteria for education which are based on it. The argument presented indicates that measures of investment in education and the returns to education are not reliable guides to policy. The second section deals with an alternative approach to the formulation of criteria for education. This involves an attempt to estimate the real economic requirements for education and training, an approach which can produce the kind of information needed for educational policy of "how much" and "what kind of" additional education is required for growth. The final section covers education and manpower planning, concluding that planning should be approached in two steps: (1) project future occupational levels and (2) deduce from these the necessary education requirements.

49. Feldman, Paul, and Hoenack, Stephen A. "Private Demand for Higher Education in the United States," The Economics and Financing of Higher Education in the United States. Prepared for Joint Economic Committee, Congress of the United States, 1969. pp. 375-395.

This study reports estimates of private demand for higher education with a cross-section sample in which State averages were used as observations, with 1963 as the year of observation. The dependent variables are proportions of 1960 high school 10th graders who attended any college offering degree-credit courses within one year of scheduled graduation from high school. Predetermined variables include: (1) tuition, (2) proximity of State's population to each type of institution, (3) labor market variables, (4) performance on aptitude test, (5) urban-rural population composition, (6) education of parents, (7) regional dummy variables, and (8) various interaction terms among these predetermined variables.

50. Galper H., and Dunn, R. M., Jr. "A Short-Run Demand Function for Higher Education in the United States," Journal of Political Economy. Vol. 77, No. 5 (September - October 1969), pp. 765-777.

This paper attempts the estimation of a demand function for undergraduate higher education in the United States over the period 1925-65. Particular attention is paid to the shortrun forces influencing college enrollments; and in this connection, the Armed Forces, working through two separate effects, are found to play a significant role.

51. Haagstrom, Gus W. The Growth of Higher Education in the United States. Berkeley, Calif.: Carnegie Commission on Higher Education, April 1971. ERIC ED 077 474.

This paper is a statistical study of the growth of higher education in the United States with emphasis upon trends in student enrollment patterns at all levels. The flow of students from high school graduation through the graduate schools is described through an examination of graduation, entrance, and attrition rates at each level, and the effects upon enrollments of such factors as the draft, G. I. Bills, the junior college movement, and economic factors. Long-term projections of degree production and enrollments in various categories are given based upon the information provided by past trends in the enrollment patterns with assumptions about the future leveling off of enrollment rates at all levels.

52. Orwig, M. D., Jones, Paul K., and Lenning, Oscar T. "Enrollment Projection Models for Institutional Planning." Report No. ACT-RR-48. Iowa City, Iowa: American College Testing Program, Research and Development Division, January 1972. ERIC ED 059 681

This paper examines alternative techniques for projecting freshman enrollment in specific academic departments. Departmental enrollment projections provided by four different projection models are compared to actual departmental enrollments at Kansas State University. Two of the models use only historical data, while the other two models are sensitized to current developments as indicated by the expressed major choices of prospective freshmen. The use of

discriminant analysis to establish differential enrollment probabilities is also explored. Although different models do a better job for different curricular departments, the smallest mean squared across all departments was obtained with the simplest projection technique. Based on the results obtained at this one institution, therefore, it would appear that simple and straightforward projection models can be useful as complex and sophisticated models.

53. Owen, J. D. "Toward a Public Employment Wage Theory: Econometric Evidence on Teacher Quality," Industrial and Labor Relations Review. Vol. 25, No. 2 (January 1972), pp. 213-222.

An application of the Carlsson-Robinson public employment wage theory to the determination of teacher salaries and quality is presented. The single-salary-scale restriction typical to many school systems is seen as a hindrance to quality control. Research indicates that longevity and the completion of graduate work are not valid measures of quality. In order for the Carlsson-Robinson model to be a useful tool in hiring, officials must endeavor to obtain the highest quality employees, given restraints, and they must attract these employees with high salaries. An hypothesis of salary determination is presented.

54. Padilla, Arthur. "Manpower Forecasts: Teacher Education in North Carolina 1971-1983," (mimeographed). Raleigh, N.C.: North Carolina Board of Higher Education, Research Division, May 1972. ERIC ED 086 642.

This publication reports the findings of the North Carolina Board of Higher Education Research Division with respect to the supply of and demand for elementary and secondary teachers in North Carolina in the 1970's. Eighteen tables of data are included in the study along with population statistics.

55. Porter, R. C. "A Growth Model Forecast of Faculty Size, etc." Review of Economics and Statistics. Vol. 47, No. 2 (May 1965), pp. 191-197.

The purpose of this paper is to show the kinds of pressure and the extent of pressure which may appear in American higher education as a result of various plausible enrollment rates between 1965 and 1980. Future growth of higher education in the United States is analyzed within a Harrod growth framework.

56. Radner, R., and Miller, L. S. "Demand and Supply in U.S. Higher Education: A Progress Report," American Economic Review. Vol. LX, No. 2 (May 1970), pp. 326-334.

Since higher education can be seen as a giant industry where students and teachers' service are inputs and graduates or dropouts are outputs, the demand for outputs and the supply of factors may be studied. This paper is a progress report on a project designed to estimate various supply, demand, cost, and technological relations in United States higher education. Such estimates will lead to more effective debates on policy issues.

57. Rand Corporation. Analysis of the Educational Personnel System. Prepared for the U.S. Department of Health, Education, and Welfare. Washington, D.C.: Rand Corp., 1974.

This Rand Report examines the flow of elementary and secondary teachers through the educational system. The study develops projections of future supply and analyzes data to be used by educational policy-makers. Eight sections make up the complete analysis: (1) Teacher Mobility in San Diego, (2) A Theory of Labor Mobility with Application to the Teacher Market, (3) The Demand for Educational Professionals, (4) Teacher Turnover, (5) The Supply of Elementary and Secondary Teachers, (6) Staffing Patterns in U.S. Public Schools, (7) Teacher Mobility in Michigan, (8) Overview and Summary.

58. Sloan, Frank A. "The Demand for Higher Education: The Case of Medical School Applicants," Journal of Human Resources. Vol. VI, No. 4 (fall 1971), pp. 466-489.

This study analyzes determinants of student demand for medical education. Two series--total applicants to medical schools and medical school applicants with superior college records--are studied. The results indicate that student career decisions are strongly related to interoccupational differences in tuition and expected incomes. Students with "A" college records are somewhat less responsive to monetary incentives. Substantial increases in medical school tuition and fees and relatively low stipend levels have decreased student interest in medicine as a career. Income differentials also have an impact. The supply of medical education, measured by the probability of a student being accepted, has a positive effect on demand.

59. Southwick, L., Jr. "The Higher Education Industry: Forecasts to 1990," Review of Social Economics. Vol. 31, No. 1 (April 1973), pp. 1-19.

The economic factors affecting the higher education industry to 1990 are reviewed. Included are analyses of the number of students demanding education, likely changes in production technology, the

supply and costs of faculty, the major factor of production, and the revenue trends of the public and private institutions of higher education. Some conclusions reached include future declines in demand, lower faculty salaries, and a continuing fiscal decline for the private schools. The forecasts are based on current and recent conditions and trends as well as an assessment of relevant political considerations, in particular, State aid to education.

60. Toder, E. J. "The Supply of Public School Teachers to an Urban Metropolitan Area: A Possible Source of Discrimination in Education," Review of Economics and Statistics. Vol. 54, No. 4 (November 1972), pp. 439-443.

This paper presents evidence that school systems with more nonwhites face a higher supply price for equivalently qualified teachers. Problems in estimating and interpreting the results are discussed, and alternative explanations considered. Empirical estimates are presented for two samples of towns and cities in Massachusetts.

61. U.S. Department of Health, Education, and Welfare, Office of Education. Education in the Seventies. Report No. OE-10051. Washington, D.C.: U.S. Government Printing Office, May 1968. ERIC ED 058 665.

This paper discusses some of the problems of estimating enrollments and expenditures of the educational establishment. Topics related to the outlook for education to 1975 include: (1) projections of school and college enrollments, (2) supply of and demand for elementary and secondary school teachers, (3) supply of and demand for instructional staff in higher education, (4) analysis of education expenditures, and (5) projected education expenditures.

62. Projections of Education Statistics. Annual Report. Washington, D.C.: U.S. Government Printing Office, 1973.

This publication provides projections of statistics for elementary and secondary schools and institutions of higher education. The statistics are projected 10 years ahead and include enrollments, graduates, teachers, and expenditures.

63. Watson, Cicely. The Elementary Teacher: A Study of the Characteristics and Supply/Demand Relations of Ontario Teachers. Toronto: Ontario Institute for Studies in Education, Department of Education Planning, 1972. ERIC ED 071 996

This planning study analyzes both the characteristics and supply/demand of elementary school teachers in Ontario. By using statistical data from 1958 to 1972, the report shows trends in (1) sources of teacher supply, (2) mobility and retention of teachers, (3) special education, and (4) effects and influence of neighboring areas on

Ontario education. From these trends, the study projects the supply of and demand for teachers with consideration for policy implications of the derived findings.

64. Wisconsin Coordinating Committee for Higher Education. Teacher Supply and Demand in Wisconsin, 1970-1980. Report No. 71-15. Madison, Wis.: Coordinating Council for Higher Education, March 1971. ERIC ED 052 157.

The first half of this document examines the national supply of and demand for teachers, while the second half is concerned with the situation in Wisconsin. The change from the teacher shortage of the 1960's to the surplus of the 1970's is traced and explained, as is the continued shortage in certain fields. Data are included on the numbers of elementary and secondary teachers between 1959 and 1970, on the projected demand through 1980, and on school population and teacher qualifications. The chapters on Wisconsin analyze the teacher supply and demand picture on the basis of information obtained from a survey of college placement officers, school district administrators, and education deans and department chairmen of Wisconsin colleges and universities engaged in teacher preparation. Eleven implications are included which summarize the present situation and suggest future directions for teacher education institutions and their students.

DEMAND AND SUPPLY OF GENERAL PROFESSIONAL PERSONNEL

Nontechnical

65. Ahamad, Bashir, and Blaug, Mark (eds.). The Practice of Manpower Forecasting: A Collection of Case Studies. The Jossey-Bass/Elsevier International Series. Amsterdam: Elsevier Scientific; San Francisco: Jossey-Bass, 1973.

Ten case studies by six authors, Bashir Ahamad, Mark Blaug, Kenneth Gannicott, Keith Hinchliffe, George Psacharopoulos, and Maureen Woodhall, plus an introduction and conclusion by the editors. Second in a series on problems of education planning, this book examines the experiences of manpower forecasting in Canada, the United States, France, Thailand, Nigeria, India, Sweden, and Britain. The authors conclude that the current manpower forecasting models are not useful for long-term education planning, and they argue that forecasting models must become optimizing models in which costs and benefits of different types of manpower are explicitly introduced.

66. American Association of State Colleges and Universities (AASCU). "Today's Education for Tomorrow's Jobs," Proceedings of the Conference on New Programs, New Professions. (Washington, D.C., October 10-13, 1971.) Washington, D.C.: American Association of State Colleges and Universities, Office of Program Development, December 1971. ERIC ED 059 656.

The goals of the conference were twofold: (1) to exchange information among representatives of AASCU institutions, officials of Federal Government agencies, representatives of professional associations, and representatives of educational organizations regarding the Nation's rising manpower needs in new fields; and (2) to discuss ways in which AASCU institutions can redirect existing resources to better meet new priorities. The conference focused on new careers in the area of education, environment, health, welfare and community service, justice, library and information services, and government and public service.

67. Lecht, L. A. Manpower Needs for National Goals in the 1970's. New York: Praeger, 1969.

This study of manpower requirements for national goals was undertaken as part of an ongoing research effort intended to provide more and better information concerning national goals and resources for the decisionmakers in the private and public sectors. General and specific discussions on both the nature of the goals and the nature of manpower planning are included. The implications for education and job training are reviewed in light of goal decisions. Manpower requirements, national goals, and research needs for the 1970's are projected.

68. National Academy of Sciences - National Research Council. Employment of New Ph.D.'s and Postdoctorals in 1971: A Survey Report. Report No. OSP-MS-5. Washington, D.C.: National Academy of Sciences August 1971. ERIC ED - 058 821.

This report summarizes the results of a survey of doctoral departments in U.S. universities in the winter of 1970-71. The study was conducted to determine the current employment status of recent recipients of the doctorate and postdoctoral degrees in the fields of science and engineering. In addition to tabulated data from the survey, the report contains background data from the Doctorate Records File that indicates long-term trends in the specified fields. The evidence of the survey shows that it was more difficult for the doctorate recipients and postdoctorals of 1970 to obtain satisfactory jobs than for those of 1969. Both underemployment and unemployment essentially doubled from 1969 to 1970. Translated into numbers of individuals on a national basis, it is estimated that about 225 Ph.D.'s of 1970 in the survey fields held jobs that did not utilize their graduate training and about 285 were unemployed.

69. National Science Foundation. Salaries and Selected Characteristics of U.S. Scientists, 1970. Washington, D.C.: U.S. Government Printing Office, 1970.

The data include the numbers and median salaries of scientists in the major science fields by highest degree attained, employment status, type of employer, and primary work activity. Also included are numbers of scientists reporting some Federal support of their work by field of science and government program. The distribution of scientists by State and by science field are shown, as well as numbers and median salaries of scientists in the 50 largest standard metropolitan statistical areas.

70. Niland, John R., (ed.). The Production of Manpower Specialists: A Volume of Selected Papers. Ithaca: New York State School of Industrial and Labor Relations, 1971.

A presentation of 12 selected papers by scholars and practitioners at a conference (Manpower for the Manpower Field) organized by Cornell University in October of 1970. The papers are in four groups dealing with aspects of manpower specialist production (training and education of administrators in manpower training) for the public sector, role of the educational sector, manpower from the perspective of and in respect to the private sector, and research experience and needs. A concluding chapter records the evaluation of these papers by a panel of six discussants.

71. O'Toole, John F., Jr., and Rosove, Perry E. California Supply and Demand for College Educated Manpower in Selected Occupations. Sacramento: California State Coordinating Council for Higher Education, 1972.

In a society that has traditionally emphasized the economic value of a college education, large numbers of college graduates in California are reporting great difficulty in finding employment, particularly during the past few years. The principal purpose of this study was to examine the relationship between projected college educated manpower needs in California and the supply of graduates in selected academic disciplines or fields of study from the State's four segments of higher education. Another important purpose of the study was to determine the extent to which projection of college and university graduates in selected occupations are expected to meet the State's manpower needs in terms of surpluses and shortages. The study was also designed to identify major State agencies and education institutions within California that are charged with significant roles in manpower planning and development, to provide a description of those roles and functions, and to determine their interrelationships.

72. Sharp, Laura M. Education and Employment: The Early Career of College Graduates. Baltimore: Johns Hopkins Press, 1970.

Using data collected in 1958 and 1963, a cohort analysis is made on graduates with bachelor's and master's degrees. The conclusion is reached that more people are spending more time and money on higher education than ever before and are being well prepared for occupations. It is also found that the undergraduate major has a larger impact on career outcomes than the institution attended. Business and education majors were found to be more local, while science and humanities majors were more mobile and cosmopolitan. Teachers at all levels were strongly committed to their work, with few wanting to change professions. Their strongest complaint was the relatively low income of the teaching profession.

73. U.S. Department of Labor. Manpower Report of the President. Annual Report. A report on manpower requirements, resources, utilization, and training by the United States Department of Labor. Washington, D.C.: U.S. Government Printing Office, 1972.

This annual report discusses various aspects of the U.S. manpower policy, describes recent developments in manpower programs and legislation, and summarizes recent labor market developments. Statistical appendix contains data on the labor force, employment, hours and earnings, productivity and national accounts, and labor force projections.

74. U.S. Department of Labor, Bureau of Labor Statistics. College Educated Workers, 1968-80. Bulletin 1676. Washington D.C.: U.S. Government Printing Office, 1970.

This bulletin analyzes the expected supply and demand for college graduates through the 1970's. A review of the manpower situation for all college graduates as well as for selected individual fields is given. Also presented are separate discussions of two subjects of special interest: (1) the outlook for college-educated women and (2) the effect of the rapid expansion of junior colleges on the supply of college-trained manpower. The demand and supply of college graduates as a whole is expected to be in relative balance during the 1970's. Nevertheless, imbalances may occur in many individual occupations. The most dramatic change is in elementary and secondary school teaching in which a more than adequate supply is expected.

75. Employment of Recent College Graduates, Special Labor Force Report 151, by V. C. Perrella. Washington, D.C.: U.S. Government Printing Office, 1973.

Concern about the increase in unemployment among professional workers as a result of the weakened job market of the early 1970's led to a special survey of recent college graduates. Survey findings are summarized in this report. Data reported point to possible imbalances in supply and demand. In their first jobs, about half of the employed degree recipients were working in jobs not directly related to their major field of study, most often because those were the only jobs they could find. Concentration of degree recipients in relatively few fields of study indicates one kind of supply problem. The report suggests the need for more active policies to point the way to occupations which show promise of increased demand.

76. Job Opportunities for College Graduates in the 1970's. New York, N.Y.: Bureau of Labor Statistics Regional Office, November 1971. ERIC ED 068 010.

This report presents tables that describe manpower needs for college graduates. Some of the areas covered are: age distribution of the labor force, employment by occupation, employment for black men, and projected job openings for college graduates and projected entrants.

77. Occupational Manpower and Training Needs. Bulletin 1701. Washington, D.C.: U.S. Government Printing Office, 1971

Chapter I illustrates ways to use information on projections of occupational requirements and supply, and training in planning education and training programs. Chapter II presents projections of future occupational requirements. Chapter III presents information on occupational training and the number of persons completing such programs. Chapter IV summarizes for each occupation the data on manpower requirements, annual openings, methods of training, and available statistics on training completions.

78. Occupational Outlook for College Graduates. Bulletin 1681. Washington, D.C.: U.S. Government Printing Office, 1970.

This bulletin provides data on expected outcomes of college-educated individuals and the environment they are likely to encounter upon entering the job market. Individual occupational statements covering 101 occupational career fields are presented, which include information on prospective imbalances in employment, nature of work, training requirements, earnings, and working conditions. The publication is designed to help college students plan their career choices.

79. U.S. Department of Labor, Manpower Administration. Employer Manpower Planning and Forecasting. Monograph 19. Washington D.C.: U.S. Government Printing Office, 1970.

This report discusses a study of current manpower planning techniques used by private firms. Topics covered include the character of manpower planning and forecasting, techniques, and a model. A sample survey of private firms in Minnesota was designed and implemented in order to provide insights into the problem of manpower planning and forecasting. Both the survey results and case examples are included.

80. Vaizey, John. "The Labor Market and the Manpower Forecaster - Some Problems," International Labor Review. Vol. 89 (April 1964), pp. 353-369.

A number of ways in which labor market factors affect long-range forecasts of the demand and supply of skilled manpower are discussed. Cases such as the migration of skills, unemployment, salaries for skilled people, and the combination of different levels of skill are examined with respect to the interaction of these technical factors with market phenomena.

81. Wolfe, D., and Kidd, C. V. "The Future Market for Ph.D.'s," Science. Vol. 173, No. 3999 (August 27, 1971), pp. 784-793.

The number of doctoral degrees awarded is expected to increase at a faster rate than the positions open to the recipients of the degrees. As a result, while degree recipients may not be unemployed, they will be employed in nontraditional jobs. The Association of American Universities spent a day discussing the future market for Ph.D.'s during the 1971-80 time period, and this paper is a summary of that discussion. One conclusion is to limit the number of degrees awarded by instituting stricter admission policies. Uneasy relationships between the Government and the universities, among universities, and among faculty are predicted.

Technical

82. Ahamad, B., and Scott, K. F. "A Note on Sensitivity Analysis in Manpower Forecasting," Journal of the Royal Statistics Society. Vol. 135, No. 3 (1972), pp. 385-392.

In projections of manpower requirements it is common practice to give specific values for future expected labor demand by occupational or educational classes. Any variance from the conditions assumed in determining such manpower requirements will modify those specific estimates. In this paper, Ahamad and Scott consider the application of sensitivity analysis to this problem. They examine some possible ap-

proaches and find that computer simulation techniques most easily give quantitative results. This is illustrated with an application for Canada.

83. Arrow, Kenneth J., and Capron, William H. "Dynamic Shortages and Price Rises: The Engineer-Scientist Case," Quarterly Journal of Economics. Vol. LXXIII, No. 2 (May 1959), pp. 292-308.

A model explaining the dynamics of the market adjustment process is applied to the scientist-engineer shortage. A dynamic shortage exists when there is a steady upward shift in the demand curve and the salaries for unfilled positions are the same as those currently paid in others of the same type and quality. Other definitions of shortages are examined. The conclusion drawn is that the engineer-scientist shortage exists because the rapid increase in demand has not been met with an equally rapid increase in price for such services.

84. Benham, L. "The Labor Market for Registered Nurses: A Three-Equation Model," Review of Economics and Statistics. Vol. 53, No. 3 (August 1971), pp. 246-252

This study investigates factors influencing the number of employed registered nurses and their earnings across States. Several aspects of simultaneous response patterns in this labor market are examined by use of a simple model which includes one structural equation for demand, one for labor force participation, and one for geographical location. Estimates of the model for 1950 and 1960 are used to examine the impact on this market of changes in per capita income, birth rates, income of husbands of registered nurses, numbers of substitutes for registered nurses, and the number of nursing schools.

85. Blank D. M., and Stigler, G. J. The Demand and Supply of Scientific Personnel. New York: National Bureau of Economic Research, 1957.

This monograph is primarily a study of the methods by which one can explain movements in the demand and supply of scientific personnel. The methods examined include a survey of earnings, Bureau of Labor Statistics prediction methodology, and the Engineers Joint Council method of prediction of demand. Headings include: the supply of engineers, demand and supply of mathematicians and physicists, and factors influencing demands for chemists and engineers.

86. Blitz, R. C., and Ow, C. H. "A Cross-Sectional Analysis of Women's Participation in the Professions," Journal of Political Economy. Vol. 81, No. 1 (January - February 1973), pp. 131-144.

This study attempts to explain differences among States of the proportion of women in the professions based on the 1960 census. This is done with demand and supply equations using the following variables: State per capita income, industrial structure, female educational endowment, availability of domestics, and ratio of male to female professional income. All of the variables performed well except the income variable. The poor performance of the latter seems to be due to its aggregative character and necessary statistical manipulations.

87. Bognanno, M. F., Hixson, J. S., and Jeffers, J. R. "The Short-Run Supply of Nurse's Time," Journal of Human Resources. Vol. IX, No. 1 (winter 1974), pp. 80-94.

With data obtained from married professional nurses, estimates are made of their labor supply response to changes in wage rates and in the husband's earnings and to the impact of other interhousehold differences. Analysis was conducted for two time periods, and for each a model was estimated to generate the probability of labor force participation and the expected amount of time worked, given participation. In contrast to the flow of labor supplied by employed married nurses, it was concluded that the participation decision is not dependent on the wage rate. Both dimensions of labor supply are dependent on the husband's earnings. The results also provide strong evidence that the supply curve is backward-bending just beyond the range of observations used in this study.

88. Cain, Glen G., Freeman, Richard B., and Hansen, W. Lee. Labor Market Analysis of Engineers and Technical Workers. Policy Studies in Employment and Welfare No. 18. Baltimore and London: Johns Hopkins University Press, 1973.

Using a supply and demand framework, the study analyzes the utilization of scientific, engineering, and technical manpower in the United States. Part I surveys the reasons for concern over the supply of scientific and technical manpower and looks at the problem of occupational definitions. Part II presents the analytical framework for examining the problem, pointing out areas where research needs to be done. Part III deals with the use of cost-benefit analyses and projections in government decisionmaking on manpower. Statistics on employment, education, and earnings of technical workers and engineers are also presented.

89. Crowley, M. F. "Professional Manpower: The Job Market Turnaround," Monthly Labor Review. Vol. 95, No. 10 (October 1972), pp. 9-15.

This article analyzes the factors underlying the growth of professional manpower in the 1960's, the current situation and the outlook for the remainder of the 1970's. The number of college graduates increased rapidly through the 1960's, with much of the growth traceable to increased public support of higher education. Employment of professional and technical workers also grew rapidly, increasing more than any other occupation group through the 1960's. As we entered the 1970's, however, employment of professional persons leveled off, but the numbers of new college graduates increased sharply.

90. Ehrenberg, R. G. "The Demand for State and Local Government Employees," American Economic Review. Vol. 63, No. 3 (June 1973), pp. 366-379.

This paper presents estimates of a set of demand equations for 11 categories of public employees which are derived from a utility maximizing model of State and local government behavior that allows for incremental budgeting. The system of equations is estimated with annual State data as the units of observation, pooling time series, and cross section information for the 1958-69 period. Virtually all classes of public employees are shown to have statistically significant wage elasticities of demand. Using simulation techniques, implications for public policy are drawn.

91. Fein, Rashi. The Doctor Shortage: An Economic Diagnosis. Washington, D.C.: The Brookings Institution, 1967.

This volume projects the future demand for physician services and the supply of physicians available to render these services. It assesses alternative ways of meeting the growth in demand and concludes that an increase in the number of physicians is but one of the ways. The author states that increases in efficiency through new patterns of organization and development of new types of personnel may offer substantial returns. Potential sources of increase in physician productivity are considered and evaluated.

92. Folger, J. F., Astin, H. S., and Bayer, A. E. Human Resources and Higher Education. New York: Russell Sage Foundation, 1970.

Currently the democratic belief in self-determination dictates that the individual choice of a major field of study and a career be voluntary. This system has worked well in bringing forth the numbers and the kinds of specialists needed to keep a large industrial nation running effectively, but there are imperfections that require attention. This text examines the system from the point of view of society rather than the individual. Section I presents projections of the new supply available to enter each field, estimates of future

demand or need, and analysis of possible career adjustments. Section II examines the factors that determine career choices and some of the principal means of adjusting them. Section III deals with popular assumptions and attitudes regarding special personnel groups: women, the poor, and immigrants. The final section assesses the soundness of manpower policies using several criteria: production, self-fulfillment, cost, and the attainment of national goals.

93. Folk, Hugh. The Shortage of Scientists and Engineers. Studies in the Social Implications of Science and Technology. Lexington, Mass.: Heath Lexington Books, 1970.

An occupational study of the engineering and science professions, with special reference to the existence of shortages. The author begins by discussing the various types of shortages and their policy implications. He goes on to measure demand and supply and discusses their determinants. Other topics include an analysis of the relevant labor market, and the economic returns to those who enter these professions. In the final chapter, the author considers the outlook and concludes that there is likely to be a continued shortage, but foresees no serious problems result from it.

94. Freeman, R. B. The Market for College-Trained Manpower: A Study in the Economics of Career Choice. Cambridge, Mass.: Harvard University Press, 1971.

This study reveals that (1) the career decisions of students are substantially influenced by economic incentives; (2) that salaries are determined by the intersection of measurable supply and demand curves with lags due to the slow response to new conditions; (3) post-war changes in the market for college graduates are explained by two adjustments or feedback models--a cobweb model in which high salaries induce students into a field, producing in 4 or 5 years an excessive number of graduates in the field, low salaries, and relatively few new entrants, and an incomplete adjustment model in which the market suffers from disequilibria for several time periods; and (4) the university system responds to market incentives by creating the training opportunities needed in the economy.

95. Hansen, W. Lee. "The Economics of Scientific and Engineering Manpower," Journal of Human Resources. Vol. II, No. 2 (spring 1967), pp. 191-220

Issues in the discussion of manpower shortages are defined. Various positions are examined, along with alternative approaches to research in the field and the analytical efforts of economists. After exploring the projection approach in detail, the rate-of-return approach is proposed to provide new insights. Finally, the paper questions the reasons for the great concern about scientific and engineering manpower and the direction of the limited amount of research in the field.

96. _____. "The Shortage of Engineers." Review of Economics and Statistics. Vol. 43 (November 1961), pp. 251-256.

The Blank-Stigler definition of shortage and the empirical test for the existence of a shortage is reexamined and supplemented with additional evidence. This approach takes salaries paid in the recent past into account as well as number of workers available. The conclusion suggests a growing shortage existed from 1953 to 1958 for engineers.

97. Hollister, R. G. "The Economics of Manpower Forecasting," International Labor Review. Vol. 89 (April 1964), pp. 371-397.

The author makes a theoretical analysis of certain aspects of manpower forecasting, in particular of the use of analogy and of the effects of supply factors and technological factors on the occupational distribution of the labor force. The conclusion drawn is that if the present product mix and present skill inputs for each product are known, and the skill coefficient is assumed to be unchanging, then with a planned future product mix, the manpower may be forecasted. However, the skill coefficient cannot be assumed to be unchanging, since changes occur in technology and the supplies and prices of skills.

98. Mantell, E. H. "Labor Markets for Engineers of Differing Ability and Education," Industrial and Labor Relations Review. Vol. 27, No. 1 (October 1973), pp. 63-73.

This study analyzes a large sample of engineers for whom data are available concerning several dimensions of ability, together with a history of their education and earnings during the 1943-70 period. A model incorporating these variables accounts for about 65 percent of the variations in annual earnings within four of the five educational groupings of the engineers studies. The author also compares the internal rates of return to education among these engineers with rates of return among members of other professions and concludes that, over the long run, the labor market has tended to produce an equilibrium between the supply of and demand for engineers of similar ability and education.

99. National Science Foundation. 1969 and 1980 Science and Engineering Doctorate Supply and Utilization. Report No. NSF-71-20. Washington, D.C.: U.S. Government Printing Office, May 1971. ERIC ED 051 782.

This study is limited to science and engineering doctorates (both Ph.D. and Doctor of Arts) and spans the period 1969 to 1980--a period for which most of the factors likely to have a significant effect on the supply and utilization of doctorates are known or can be reason-

ably anticipated. The basic methodology involves statistically projecting past and current trends, including reasonable variations, into the future. Projections cover the areas of engineering, physical sciences, social sciences, life sciences, and mathematics.

100. Connell, John F. "The Labor Market for Engineers: An Alternative Methodology," Journal of Human Resources. Vol. VII, No. 1 (winter 1972), pp. 71-86.

The labor market for engineers is analyzed by constructing and estimating separate demand and supply schedules. Both ordinary least squares and two-stage least squares are employed. Estimated cross-price elasticities of demand are used as a measure of the complementarity or substitutability of engineers and other factor inputs. The following conclusions emerge: The relative wage elasticity of demand is not a significant determinant of engineering employment though, with minor exception, research and development expenditures are. The supply of engineers tends to be responsive to absolute wage differences. Related occupations requiring less formal education than engineers tend to be complements rather than substitutes.

101. Scoville, James C. Manpower and Occupational Analysis: Concepts and Measurements. Lexington, Mass., Toronto, and London: D. C. Heath, 1972.

A study of the problems of occupational and manpower information systems which describes their uses by social scientists, government agencies, and businesses. Discussed are the conceptual bases and limitations of occupational and manpower classification systems most frequently used--the Dictionary of Occupational Titles, census data, International Standard Classifications of Occupations. The author presents his own economic theory of jobs and recommendations for improving the sources of data and classification systems of jobs and manpower.

102. Thonstad, Tore. Education and Manpower: Theoretical Models and Empirical Applications. Toronto: University of Toronto Press, 1968.

The two main topics the book considers are an analysis of the educational system and the adaptation of that system to social requirements for qualified manpower. Both topics are mathematically analyzed under the assumptions of stationary and then dynamic conditions.

103. U.S. Department of Labor, Bureau of Labor Statistics. Patterns of U.S. Economic Growth. Bulletin 1672. Washington, D.C.: U.S. Government Printing Office, 1970.

In this report estimates of 1980 demand, output, and employment are presented as projections of what the economy might be like under a given set of assumptions. Four alternative 1980 models, grouped into two sets, are discussed.

104. The United States Economy in 1985. An Overview of BLS Projections by Jack Alterman. Washington, D.C.: U.S. Government Printing Office, 1970.

Bureau of Labor Statistics projections of the U.S. economy to 1985 are highlighted by two significant departures from past trends: (1) a sharp slowdown in overall economic growth and (2) a potential oversupply of college graduates, both to begin in the late 1970's. This article discusses the new projections and summarizes major assumptions and techniques underlying them. In addition, a summary comparison of revised projections to 1980 with earlier estimates for that year is also included.

105. Tomorrow's Manpower Needs: National Manpower Projections and Guide to Their Use as a Tool in Developing State and Area Manpower Projections. Bulletin No. 1606. Four Volumes. Washington, D.C.: U.S. Government Printing Office, 1969.

Volume I, Developing Area Manpower Projections, presents projections of population and labor force by States to 1980, by age, sex, and color, together with retirement rates. Volume II, National Trends and Outlook: Industrial Employment and Occupational Structure, considers projected changes in manpower requirements in each major industry. Volume III, National Trends and Output: Occupational Employment, projects 1975 requirements for workers in over 40 occupational groups. Volume IV, The National Industry-Occupational Matrix and Other Data, is mostly taken up with tables showing (for 1960 and projected 1975) the percentage distribution of employment by occupation in 155 industries.

106. Wachter, M. L. "A Labor Supply Model for Secondary Workers," Review of Economics and Statistics. Vol. 54, No. 2 (May 1972), pp. 141-151

The purpose of this paper is to estimate a labor supply or participation rate function, for the period 1948 through 1968, for the various age-sex groups that comprise the secondary labor force. There are three major findings of the paper. First, participation behavior is primarily explained by real wages. There are, however, two hypotheses, the relative and the permanent wage models that may underlie the wage

variables. Second, the supply of labor responds positively to a variable that reflects the rate of inflation. Third, the labor supply is found to respond to changes in excess demand conditions in the labor market only during periods of chronic high unemployment, 1958-1966; and even during that period, the effect observed is considerably smaller than that noted in earlier studies.

POLICY IMPACT STUDIES

Nontechnical

107. Mathematica, Inc. An Economic Analysis of Alternative Programs to Finance Higher Education. Bethesda, Md.: Mathematica, Inc., September 1971.
ERIC ED 060 800.

The Federal Government operates several programs that provide money, either as loans or as a combination of grants and loans, to students. This paper attempts to clarify the economic and budgetary implications associated with continuing these existing programs, and discusses the differing economic consequences that would follow if some alternative approaches were instituted.

Technical

108. Balderston, F. E., and Radner, Roy. Academic Demand for New Ph.D.'s, 1970-90: Its Sensitivity to Alternative Policies. Center for the Study of Higher Education, Report No. 20. University Park, Pa.: Pennsylvania State University, February 1973.

This report investigates the plausibility of various methods of projecting academic demand for doctorates over the decades of the 1970's and 1980's. Contributions to this demand by different sectors of higher education are examined, and some policy implications relevant to various decisionmakers involved in higher education are presented. Projections of sectoral demand for doctorates are based on judgmental assumptions about the distribution of future enrollment. Policy implications presented include financing decisions for supporting both students and institutions which award the doctoral degree.

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