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ABSTRACT

Designed to help occupational analysts, employment and training operators, guidance counselors, and vocational educators to better assess the source, content, and level of training necessary to achieve the desired skill requirements for most occupations, this report contains an analysis of training patters for clusters of occupations, a case study, and appendixes of technical information. Part 1 reviews concepts, trends, and data related to training in six chapters: (1) Introduction, (2) Definitions, (3 and 4) Patterns of Training: Pre-employment and Post-employment, (5) Data Sources on the Supply and Demand for Labor, and (6) Using the Data. Part 2 (chapter 7) is an attempt to apply the principles of part 1 in a case study of New York City. Part 3 is a series of appendixes, giving technical information on the level and types of training for detailed census occupations, including these: 1970 Census Occupational Categories by Training Clusters and specific information on these clusters of occupations: health care; apparel manufacturing; metal working and machine trade; computer or electronic data processing; construction; printing crafts; clerical; sales; appliance repair; consumer goods; and insurance industry. (YLB)

Training Information for Policy Guidance

R&D Monograph 76

U.S. Department of Labor
Ray Marshall, Secretary

Employment and Training Administration
Ernest G. Green
Assistant Secretary for Employment and Training
1980

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FOREWORD

This monograph is designed to help occupational analysts, employment and training operators, guidance counselors and vocational educators to better assess the source, content and level of training necessary to achieve the desired skill requirements for most occupations.

The monograph, prepared by Marcia K. Freedman and Anna B. Dutka of the Conservation of Human Resources Project, Columbia University, analyzes patterns of training for clusters of occupations. A major conclusion is that ultimately the most important external factor in the success of an occupational curriculum is linkage between the training and the employing institution.

The report furnishes detail on variations in the timing and in the places where job skills are acquired. Post-employment training is the principal mode of learning skills for many occupations, but as basic literacy requirements have risen, and as job skills have been more formally described, the amount of time and resources devoted to pre-employment training in classrooms has continually increased. Furthermore, some pre-employment training is also being stressed in order to make persons more capable of learning on the job. In the discussion of apprenticeship, the authors agree with many other experts who view this form as the ideal mix of classroom and on-the-job training, although it has held only a minor place in the skill acquisition scheme in the United States.

In addition, the report discusses the importance of information. The planning of training programs requires data on the current state of labor market demand and also on the required characteristics of the labor supply. Prospective workers also need information, particularly where acquiring training is dependent on acquiring a job. Especially in these cases, they need information not only about job openings, but also about the screening criteria and the training practices of local companies.

This monograph is a very useful document for all parties interested in the relationship between occupational skills and modes of training and provides a better understanding of training as a process of skill acquisition rather than formal instruction confined to one period of time.

HOWARD ROSEN
Director
Office of Research and Development

PREFACE

There has always been a tension in American education between what might properly be called education and training in the sense of acquisition of occupational skills. As returns to investment in secondary and post-secondary education diminished from their high levels of the sixties, more attention has been focused on skill training as an aid to labor-market entry. Sometimes this emphasis has led to the neglect of a basic fact, that occupational training is a process rather than an event. Above and beyond the requirements of literacy, the skills needed for entry into an occupation may customarily be learned in a classroom, but even for those jobs that seem to have fixed skill requirements over and above a specified level of literacy, a good deal of the practical knowledge related to day to day activity on the job is acquired after employment. For many jobs, the only entry requirement is literacy, and everything else that might be subsumed under training is learned on the job.

From the point of view of a program operator, the choices that may be made with respect to training programs are more constrained than they may seem at first glance. The purpose of this monograph is to provide a framework for examining those choices. Part I (Chapters 1-6) reviews concepts, trends and data related to training. Part II (Chapter 7) is an attempt to apply the principles of Part I in a case study of New York City. Part III is a series of appendixes giving technical information on the level and types of training for detailed census occupations. Prepublication comments have revealed that the value attached to various parts differs according to the needs of the reader. The arrangement, therefore, proceeds from the general to the specific.

In addition to those mentioned specifically in the text, we would like to express thanks to Eli Cohen of the New York City Board of Education, Jon Hall of the New York State Department of Labor, Donald Menzi of the New York City Department of Employment, Susan Hudson-Wilson of Boston University, Janet Regan Weeks of Northwestern University and W. W. Wilms of the University of California at Los Angeles.

Equally pleasant is an acknowledgement of the support given us by Dr. Eli Ginzberg, Director of the Conservation of Human Resources Project, and by Kathy Naughton, Charles Phillips and Ellen Sehgal of the Employment and Training Administration of the U.S. Department of Labor.

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We claim exclusive proprietorship of all remaining errors.

Marcia Freedman
Anna B. Dutka

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PART I

1. INTRODUCTION

The study presented in these pages is designed to fill certain gaps in information about the institutional origins of occupational skills. Each employing organization is familiar with its own source of supply and its own methods for training or breaking in entry workers, and each training organization is familiar with its own course offerings, but the information connections between the two are likely to be attenuated. Both employers and schools, if called upon to do so, may make a rational case for their decisions, but while an employer is likely to invoke some specific need, a school is likely to rest its case on some general demand, or on the even vaguer presumption that training is a good in itself. There is plenty of precedent for such an elevation of training. It was Mark Twain, after all, who said:

> Training is everything. The peach was once a bitter almond, the cauliflower nothing but a cabbage with a college education.

And it is but a brief step from simple admiration to the view that training and education constitute the most desirable approaches to a variety of social problems. 1/

Even before the spread of human capital theory in neo-classical economics and the popularization of the notion that activities designed to enhance personal development were "investments" that could be expected to produce "returns," American education had a distinctly vocational bent. In the Seventies, when the "returns" to general, liberal education became less certain, programs for teaching occupational skills became more attractive. If a college education could not make a cauliflower from a cabbage, a more focused curriculum might produce some hybrid that would be just as palatable and much less expensive.

The proliferation of courses has been accompanied by a proliferation of institutional forms competing with each other and with previously established methods for imparting skills. When vocational educators, CETA planners, operators of youth employment programs, or nonprofit groups surveying opportunities for certain target populations, need to make decisions with respect to training programs, they are faced with formal preemployment courses that are already in place and a range of on-the-job training whose details are unclear to observers outside the enterprise's walls.

1/ Among other things, their appeal lies in indirectness, since ". . .for various reasons, a direct attack on social and economic inequities, if not altogether blocked, is often more difficult to implement than the indirect policy instrument of education." Richard S. Eckaus, Estimating the Returns to Education: A Disaggregated Approach. Berkeley, Calif.: Carnegie Commission on Higher Education, 1973, p. viii.

Beginning with a basic distinction between on-the-job and off-the-job training, Zymelman 2/ offers the following outline of types of training.

A. Training on the job
   1. Formal on-the-job training
   2. Informal training

B. Training off the job
   1. Location and/or sponsor
      a. Public school
      b. Work place or employer
      c. Training center
      d. Private proprietary school
      e. Equipment manufacturers
   2. Kind of classroom and/or course
      a. Shop class
      b. Classroom
         (i) Vocational (related instruction)
         (ii) Academic or nonvocational

C. Combined types of training
   1. Formal apprenticeship
   2. On-the-job training plus related instruction

It would be incorrect to infer from this typology that the choice of location, sponsor or course may be freely made on the basis of cost-effectiveness or some other rational measure of outcome alone. Large, self-contained organizations like the armed forces are able to use objective criteria for deciding whether training is best offered in the workplace, outside it, or in some combination. In organizations with less control over all aspects of personnel utilization, choices of training modalities must be made in a broader context. 3/

Ideally, this context includes estimates of both the supply and the demand sides of the labor market for individuals with specific occupational skills. Since, as we shall observe, available estimates do not inspire much confidence, decisions are perforce made with less

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2/ Manuel Zymelman, The Economic Evaluation of Vocational Training Programs. Baltimore: Johns Hopkins University Press, 1976, pp. 9-10.

3/ See Zymelman, op. cit. and Rupert N. Evans, Arne Holter, and Marilyn Stern, "Criteria for Determining Whether Competency Should be Taught On-The-Job or in a Formal Technical Course," The Journal of Vocational Education Research, I (Spring 1976), pp. 21-38.

than perfect information. On the supply side, a common tactic is to survey formal offerings of public and proprietary schools in a labor market area, but sooner or later, it becomes clear that this effort yields only a partial picture. In addition to omitting considerations of other sources of supply, counting the output of institutions does not permit judgments of the quality of the training or the fate of program graduates. While placement information is helpful, it is not always the case that finding a job after taking a course was the result of taking the course.

What is most important to recognize is that, differences in costs and quality aside, training pathways vary systematically by industry, occupation and skill level. The idea may persist that institutions compete on an equal basis, or as if all other things were equal, but in fact, local training agencies have less choice of optimal strategies than they may believe, and they overlook systematic differences in the acquisition of occupational skills at their peril. While some may adapt quickly to the network already in place, others make avoidable mistakes in the allocation of resources before they gain the information they need to make better decisions.

Training organizations must look carefully at the appropriateness of their offereings especially when new courses are being planned. They should know in advance the generalized patterns of skill acquisition for entry-level jobs in various industries. It is this kind of information, beginning with occupational categories and, in a sense, going backwards to describe training routes, that the present study attempts to put into perspective.

THE CLUSTERING SCHEME

While there are a number of ways of describing and classifying occupations, census titles are by far the best-known and the most widely used, both for the presentation of occupational information and as the basis for other measurements such as prestige scales. The major divisions of the census demarcate white-collar from blue-collar and "service" work and were themselves originally intended to reflect socioeconomic status. Within these large groupings, detailed occupational titles differentiate work activities; over time, the definitions have been adjusted as the amount of detail has grown.

For this study, we have formed clusters out of the detailed groups of the 1970 census in such as a way as to stress two dimensions:

1. The skill level of the occupation, expressed as the time that is necessary for training. 4/

4/ This measure (known as "Specific Vocational Preparation") and its origins are described in Appendix A and discussed in Chapter 2.

2. Whether formal training is typically required before entry into the occupation.

Additional subdivisions are made chiefly for ease of presentation and are not meant to imply hierarchical rankings. The result is a scheme that focuses on modes of skill acquisition that require varying lengths of time, leaving other occupational attributes aside.

This scheme of ten clusters is presented in Table 1. Taken together, the data represent the approximately 75 million jobs held by the labor force in 1970, excluding second or "moonlighting" jobs. The absolute numbers are out of date, but are included to give the reader an idea of the relative size of the training clusters. The detailed census occupations belonging to each cluster are listed in the appendices, together with annotations on institutional patterns of training for selected occupations and groups of occupations. Because the monograph is intended for use mainly by those who are responsible for the preparation of entry workers in conventional occupations, three of the clusters in Table 1.1 are included only for completeness: Professionals; Managers, Administrators and Supervisors; and Artists and Performers. The training routes for professionals are too well-known to require the addition of any detail. Managers, etc., are often recruited from other occupational groups as part of an upgrading process. For salaried jobs in large firms, both liberal arts and business school graduates are increasingly a source of personnel. In any case, the complexities of skill acquisition and promotion routes would require a wholly separate study. Artists and Performers also have diverse patterns of job and skill acquisition. More important is the fact that they possess specific talents, developed in both formal instruction (often over long periods) and experience.

The headings, "Pre-employment Training Required" and "Pre-employment Training Not Required," are meant to provide a general distinction. In the case of the former, the intent is to list those occupations in which pre-employment training is standardized to provide specific skill outcomes. Thus, 45 words per minute is an easily understood standard for typing. In other cases, credentialing and licensing provide standards of performance for entry workers. The fact that employment is preceded by a structured course of training should not be taken to mean that entrants are fully prepared to perform the job at an acceptable level at the moment of employment. In fact, a case could be made that every new job requires at the least a period of orientation, and many require considerable time for learning specific tasks associated with the job for which pre-employment training has provided the general background.

Conversely, to say that pre-employment training is not required is not to rule it out altogether or to gainsay its possible usefulness. In fact, there is an historical tendency toward increasingly formal pre-employment training, which has encompassed not only the professions,

Table 1. Distribution of 1970 Experienced Civilian Labor Force by Occupational Clusters

		N (000)	Percent
PRE-EMPLOYMENT TRAINING REQUIRED	24.0%		
1. Professionals - Two Years or More of Preparation in Colleges, Graduate and Professional Schools		7,905.4	10.5%
2. Technical, Clerical and Service Workers - At Least Three Months' Specific Vocational Preparation		10,119.8	13.5
PRE-EMPLOYMENT TRAINING NOT REQUIRED	63.1%		
3. High-Skill White-Collar Occupations New Entrants Increasingly Recruited from Colleges and Trained on the Job		2,194.8	2.9
4. High-Skill Blue-Collar Occupations Two Years of More of Training After Employment		8,029.8	10.7
5. Other Skilled and Semi-Skilled Occupations - Three Months to Two Years Training After Employment		9,151.6	12.2
Low-Skill Occupations - Training Less Than Three Months, Entirely On The Job			
6. Clerical		7,440.2	9.9
7. Blue-Collar	37.3%	13,855.9	18.4
8. Service		6,725.2	9.0
DIVERSE TRAINING PATTERNS	12.9%		
9. Managers, Administrators, and Supervisors		9,350.5	12.4
10. Artists and Performers		368.1	0.5
	Total	75,141.3	100.0%

Source: U.S. Census, 1970.

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but many other occupations. Allied health occupations are only the most obvious of these. Some occupations on the list of those not requiring pre-employment training are undoubtedly in the same process of transition.

The distinction is made here to underscore the point that many occupational skills are learned after employment, rather than before. Some may be learned before, and a case can be made that such learning gives the aspirant a competitive advantage. Nevertheless, pre-employment training is only one possible advantage--others take the form of information about job openings and special access in the form of personal ties through family, friends or already employed workers.

PLAN OF PART I

Chapter 2 reviews the connotations of the word "training" and its relationship to general educational development. Chapters 3 and 4 discuss the trends in sites of training and the barriers to entry in offering additional courses; Chapter 3 covers pre-employment, and Chapter 4, post-employment or on-the-job training. Chapter 5 describes in summary form the data sources available to planners and discusses their strengths and weaknesses for decision-making purposes. Chapter 6 extends the discussion of how the data have been used and how they might be used to establish a context for application. Needless to say, this context is intended as a general guide to be supplemented by local knowledge about training institutions and employer practices.

2. DEFINITIONS

In any discussion of training, the first thing that has to be faced is the ambiguity of terms. The words, "education" and "training," are often interchanged, not because the people who use them are imprecise, but because there is considerable overlap in everyday usage. For example, professional schools, which by definition offer "training" to prospective doctors, lawyers, architects, journalists and business executives, are integral parts of "educational" institutions. Occupationally oriented curricula are also available in two- and four-year colleges. In all these cases, the "training" activity that takes place culminates in the award of an "educational" degree.

On the other hand, both students and nonstudents can earn college credits for "experiential learning." The American Council on Education (ACE) evaluates company courses as an aid to colleges in deciding whether or not to grant credit. The 1979 ACE guide made credit recommendations for 1,000 courses offered by 80 organizations. 5/ ACE has also had a grant from the U.S. Department of Labor to study the "Feasibility of Awarding Postsecondary Credit on the Basis of /Registered/ Apprenticeship Programs."

The purposes of education and training may be ambiguous, since they often are a mix of socialization and talent development. Training, in the sense of acquiring occupational skills, reflects still another and much more restricted usage. We recognize that the attributes of a person are inextricably linked, and that, for example, there is no point in teaching the manual skills required for drafters unless the students have highly developed spatial perception that permits them to interpret cross-sectional drawings. Obviously, every individual is not a potential candidate for every occupation. To be sure, in a loose labor market, irrelevant job requirements may be added to relevant ones for screening purposes, thereby narrowing the applicant pool. But while the qualities required for most jobs are neither precious nor scarce, the division of labor remains dependent on the self-selection of workers with different interests, aptitudes and opportunities.

For our purposes, that is, in order to focus on the acquisition of occupation-related skills, we must assume that selection will take into account levels of general education as well as abilities and predisposition. In the different views of employers, educators and economists, this assumption may or may not be made explicit.

5/ For some details on this arrangement with the State University of New York, see Seymour Lusterman, Education in Industry. New York: The Conference Board, 1977. For suggested guidelines, see National Center for Research in Vocational Education, Experiential Education Policy Guidelines. Columbus, Ohio: The Center, 1979, Chapter 13.

EMPLOYER DEFINITIONS

From an employer's point of view, the overlap between education and training does not present a conceptual problem: the totality of training activity, whether provided in school, armed services, factory or office, is embodied in workers whose "productivity" is indivisible. 6/ It is probably for this reason that the dialogue between educators and employers so seldom departs from the customary script in which school people seek answers to the question of how to make students more employable, and employers respond, first, with complaints about the poor preparation of entry workers and, second, with a typical list of desirable qualities.

When leading employer and education representatives were convened in nine widely scattered cities, the skills perceived by the employer participants to be most useful ranged from the most abstract personal qualities to the most specific job tasks. But it was those in the personal realm such as communicating, working with others, and a positive attitude toward work, that were most frequently mentioned. 7/

This combination of "skills" covers two distinct realms--the ability to speak, read and calculate, sometimes called basic skills, and the ability to comport oneself according to the standards of the employing firm. 8/ Since these vary between firms and even within firms, the pressures on entry workers to find their way may be acute. And the issue is confounded by the variety of subcultures and styles that coexist in the larger society. On balance, however, it seems safe to say that, other things being equal, sobriety, pleasantness and application go a long way in most work settings. Being able to communicate, to relate easily to others, and to demonstrate a positive attitude toward work, are widely regarded as characteristics of a good employee. These qualities become evident in performance on the job, and, taken together

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6/ As in all matters relating to training, there are exceptions here. In the recruitment of managers and professionals, graduates of certain schools enjoy special advantages in the labor market.

7/ Allen A. Wiant, Transferable Skills: The Employers' Viewpoint. Columbus, Ohio: The Center for Vocational Education, 1978. The desired competencies (and the outstanding deficiencies) are virtually the same in all industrialized countries: basic cognitive skills, personal qualities and work attitudes, interpersonal skills and analytic abilities, and specific occupational skills. See Beatrice G. Reubens, "Transition from School to Work - The European Experience." Prepared for delivery at the National Center for Research in Vocational Education, Ohio State University, October 11, 1978.

8/ For an example of the importance of standard speech, see Larry M. Blair and Hugh S. Connor, "Speech Styles and Employment Opportunties." Paper delivered at the Annual Meeting of the Industrial Relations Research Association, New York, December 1977.

with specific knowledge, are valued for their positive contribution to productivity. Workers who possess these desirable traits are favored in competition with others for promotion or transfer. 9/

It is this generalized focus that accounts in part for the tendency of employers and educators to talk past each other. Personnel specialists express the view, for example, that vocational schools should not attempt to produce craftsmen but should offer programs relevant to the broader aspects of the work world. Vocational educators, on their side, argue that employers want immediately usable, job-specific skills and do not, in fact, prefer to hire graduates with only general occupational preparation. 10/ Some of this difference in perception depends on the state of the labor market as well as on the specificity of the skill involved. When employment is expanding, large employers will recruit generally prepared entry workers and train them on the job. When the market is loose, they may screen applicants to obtain those with higher levels of the basic skills, but for many jobs, a more attractive tactic is to cut back training efforts and recruit from the available pool of the experienced unemployed. In this situation, recent high-school graduates are in no position to compete.

EDUCATIONAL PSYCHOLOGY

The conventional response of employers described above is akin to the view in educational psychology that the term "skill" may refer to any learned behavior, that is, that each person brings to the tasks required in daily life a bundle of attributes--learned behaviors--that are potentially useful in any setting. Such an interpretation specifically does not include the connotation of attainment of an acceptable level of proficiency, 11/ and employers concerned with performance would necessarily add this dimension in day-to-day practice.

Jerome Moss has suggested a scheme (Chart 1) that links the notion of learned behavior to the notion of proficiency. He classifies the skills of individuals that permit them to perform occupational tasks into four categories--psychomotor, informational, cognitive process, and affective. Each of these in turn reflects prerequisites for selection for training. Presumably, the levels of such skills as physical coordination, literacy, and coping behavior may be empirically determined for given courses of training. Training, in turn, is designed to impart more narrowly defined attributes required for occupational performance.

9/ Wiant, op. cit.

10/ Ibid.

11/ Douglas Sjogren, Occupationally-Transferable Skills and Characteristics: Review of Literature and Research. Columbus, Ohio: The Center for Vocational Education, 1977.

Chart 1

Basic and Applied Skills

	Psychomotor	Informational	Cognitive Process	Affective
BASIC	Sensory activity, coordination manual dexterity, etc.	"Learnings tools" (Literacy, numeracy)	Cognitive aptitudes	Personality, coping behavior, etc.
APPLIED	Specific occupational manipulative skills	Specific occupational information	Mediation skills (Problem solving, planning, etc.)	Work habits, attitudes, values, and interpersonal skills

Source: Jerome Moss, University of Minnesota

In Moss's scheme, the skills to be developed by training reflect stated employer preoccupations with communication, interpersonal skills and "motivation." One can assume that employers also desire workers to possess "specific occupational manipulative skills" and "specific occupational information." They simply assume that they have the "make or buy" decision. As we shall see in Chapter 3, these decisions may not be based on the most precise calculations, but they do emerge from some combination of market signals and institutionalized patterns for learning the details of occupational tasks.

ECONOMICS

To economists, the important distinction is not between education and training--Jacob Mincer, for example, defines "training" as ". . . .investment in acquisition of skill or in improvement of work productivity. . . ." wherever it takes place. 12/ What does matter is whether the training is "general" or "specific." 13/ In its original formulation by Gary Becker, specific training is defined as that which increases productivity more in firms providing it than in other firms:

> Completely specific training can be defined as training that has no effect on the productivity of trainees that would be useful in other firms. 14/

Becker does allow for some ambiguity at the margins of this distinction:

> Much on-the-job training is neither completely specific nor completely general but increases productivity more in the firms providing it and falls within the definition of specific training. The rest increases productivity by at least as much as in other firms and falls within a definition of general training. 15/

To some extent, all skill acquisition that contributes to "productivity" is a continuum with different weights attached to general and specific elements. General training, whether offered by employers or by schools,

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12/ Jacob Mincer, "On-The-Job Training: Costs, Returns, and Some Implications," Journal of Political Economy, Supplement, LXX (October 1962), p. 52.

13/ This distinction has a number of implications in human capital theory that are beyond the scope of our interest here. For a critique of the issues, see Mark Blaug, "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey," Journal of Economic Literature, XIV (September 1976), pp. 827-855.

14/ Gary S. Becker, Human Capital. New York: National Bureau of Economic Research, 1964, p. 18.

15/ Ibid.

implies transferability. A person who can type accurately at an acceptable rate of speed has received general training; the specific training required to fit into a new employing organization may be limited to a brief orientation regarding company procedures and the precise duties of the job. The operator of a specialized metal-working machine can presumably work on a similar job for another firm in the same or a related branch of industry, although in the case of such a transfer, something more than brief orientation might be required. A miner in deep-coal mining has acquired skills that are more narrowly industry-specific, transferable to another coal mine, but probably of less use in other occupations or industries.

As we shall see, in planning training, firms may elect to limit the skills to be developed to those that are narrowly required, in an attempt to lessen the chances of losing trained workers to other firms. But even though the notion of specific training implies a narrow focus, firm-specific knowledge may also be found in jobs that combine occupational tasks in a unique way. Thus, assemblers of heavy equipment who need a variety of skills are likely to be more valuable to their employers than to other firms, particularly if their mastery of the job is based on long experience.

In any case, it is hard to imagine a job that is entirely firm-specific in the sense that the incumbent is forever bound by virtue of the narrowness of training per se. For our purposes, the general-specific distinction is more useful when it is considered in conjunction with institutional factors. Becker observed that firms tend to pay more to workers trained in their own plants than the same workers could earn elsewhere, because their specific training is worth more in productivity terms. 16/ But whether the investment in training is a cause or an effect, it may well be that employers pay those workers they consider to be "temporary" for their currently available labor services, while they pay "permanent" employees more for the contribution they are expected to make in the future as their (specific) on-the-job training and experience become more valuable to the firm. 17/

Firms that offer formal training, whether general or specific, are likely to be large and to recruit for promotion on the basis of seniority. These internal labor market practices, which distinguish "permanent" from "temporary" workers make a greater contribution to earnings than

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16/ Ibid., p. 24.

17/ Melvin W. Reder, "A Partial Survey of the Theory of Income Size Distribution," Six Papers on the Size Distribution of Wealth and Income, Lee Soltow, ed. New York: National Bureau of Economic Research, 1969, p. 236 ff.

skill or knowledge acquired by workers before joining the firm. 18/ All companies do not have well-developed internal labor markets, but in those that do, systematic bidding for vacancies; promotion from within; opportunities for structured training, as well as learning by doing; and even the introduction of nominal hierarchies for promotion purely for pay purposes--all add up to what Clark Kerr called different treatment for the "ins" and the "outs." 19/

The benefits conferred upon the "ins," and especially the accumulation of seniority rights, weakens the distinction between general and specific training as it affects turnover. In fact, companies have considerable latitude in affecting turnover, and conversely, the accumulation of tenure on the job, by the training strategies they adopt. These in turn interact with the accumulation of other benefits, so that as "permanent" workers increase their rights to and in the job, they are less likely to seek greener pastures elsewhere.

In occupations where training is usally acquired before employment--what might be called the most general case of general training--internal labor market provisions tend to be weak or nonexistent. Here too there are exceptions, the most obvious in the ranks of salaried managers. In the lower occupational strata, however, the narrow scope of employment possibilities, reinforced by licensing and other forms of accreditation, undermines the continuing acquisition of skills and the development of promotional systems in the firm. The allied health field is an outstanding example where training is narrowly conceived, even though there is considerable overlap of tasks, because of the historic growth of institutional barriers.

THE ACQUISITION OF OCCUPATIONAL SKILLS

The definitions and connotations attached to the word "training," as we have seen, vary according to the vantage-point of the observer. Each is applicable in its own context, and in that sense no one usage has the status of being preferred. This monograph seeks to narrow the context for analysis to the sources of skill acquisition--the training modalities for different clusters of occupations. For this purpose, training is defined as the activity that provides workers with those occupation-specific skills required for an acceptable level of performance on the job.

From this focus, training is inextricably linked to the question

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18/ Myron Roomkin and Gerald G. Somers, "The Wage Benefits of Alternative Sources of Skill Development," Industrial and Labor Relations Review, 27 (January 1974), p. 241.

19/ Clark Kerr, "The Balkanization of Labor Markets," Labor Markets and Wage Determination. Berkeley: University of California Press, 1977, pp. 21-37.

of access because how one learns is institutionally related to how one finds employment. The question being asked here is, "What is the typical pathway to becoming an architect, a systems analyst, an electrician, a beautician, a typesetter, or a member of any other group with a designated set of skills that match the task requirements of an occupation?" In the discussion that follows, references occur to different sources of training--schools and colleges, trade schools and the armed forces, company-based training, and so on--but the major distinction is between those job-related skills that are acquired before employment and are prerequisites for employment in the field, and those that are acquired only after employment.

We know that every job has some requirement(s) for entry, and some of the tasks related to the job can only be learned after employment, no matter how high the level of pre-employment training. The distinction, like the economist's distinction between general and specific training, is therefore not hard and fast, but more a matter of emphasis. It can be illustrated by contrasting the entry patterns for two occupations--engineer and telephone repairer. When firms recruit graduates of engineering schools, they expect that all new hires will require some on-the-job training. An engineering degree constitutes general training; engineers must still acquire those specific skills that will permit them to perform their functions in an organization. Telephone repairers, on the other hand, are generally recruited by a testing and screening program that measures their suitability for the occupation but does not require the applicant to demonstrate specific job-related skills. The company assumes the entire burden of training. Engineers enter the labor market with a credential that attests to occupational preparation; telephone repairers enter without previous occupational preparation and learn their craft only after they are hired.

This illustration is based on well-known patterns. In other cases, and particularly where occupations are in rapidly growing or changing fields, the patterns are not so clear nor are they always apparent to the lay public.

ESTIMATING SKILL LEVELS

In addition to the emphasis on whether occupational training takes place before or after employment, occupations are distinguished by their skill level. In this connection, we use the training time scheme of the Dictionary of Occupational Titles. 20/ Training time is measured by two scales, General Educational Development (GED) and Specific Vocational Preparation (SVP). GED was designed specifically to avoid measurement in years of schooling. It has six levels, determined by the highest of

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20/ U.S. Department of Labor, Dictionary of Occupational Titles, 3rd edition. Washington: Government Printing Office, 1965. For each occupational description, the DOT also provides information on six types of physical demands and eight types of working conditions.

its three component parts--reasoning development, mathematical development and language development. Thus, a job that requires execution of instructions furnished in standardized written, oral, or diagrammatic form is rated as GED level 3, even if no arithmetic calculations are required. The entire GED scheme is reproduced in an appendix to this monograph, but it is worth noting here that even the lowest level (GED 1) includes under "mathematical development" the ability to "perform simple addition and subtraction. . .counting and recording"; and under "language development," the ability to "write identifying information" and make requests "orally or in writing."

We know that functional illiterates hold down jobs in the United States. But, increasingly, the minimum educational achievement for employment is a sixth-grade reading level, which most specialists consider the take-off point for learning new material. The subject of improving performance in such basic areas as speaking, reading and computing is of paramount importance, but it is beyond the scope of this study.

Specific Vocational Preparation (SVP) is a scale that specifies the amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. (For a full defintion, see Appendix A). This time may be spent before employment or after employment in a variety of institutional and informal settings. We use this scale as a measure of relative skill in strictly occupational terms, with the assumption that skill development is closely related to educational development. This assumption is warranted by the high correlation between GED and SVP as these measures have been assigned in the Dictionary, something on the order of .80.

OCCUPATIONAL CATEGORIES

The units of analysis for the study are the 440 detailed occupational classifications of the 1970 Census. Social scientists who work with occupational data are aware of the difficulties in using this sheme and have often called attention to the over-specificity of some groups, like "weavers" and "loom fixers" that persist from an earlier time when the textile industry was more important in the economy than it is now, and the heterogeneity of other groups, like "assemblers," that cover work at several levels of complexity. Nevertheless, we chose to use the census categories because of the availability of data conformed to them.

In particular, it is possible to express SVP, which was originally estimated for the some 20,000 titles of the Dictionary, as a mean and also to produce a weighted distribution for each census group. 21/ This

21/ The aggregating scheme comes from Lloyd V. Temme, Occupation: Meanings and Measures. Washington: Bureau of Social Science Research, June 1975.

distribution is discussed in Appendix C and appears in Appendix D. Our major use of the mean SVPs is to group occupations into broad ranges of skill by the training time required to perform them.

In summary, the method used to sort occupations into preliminary clusters consists of, 1) distinguishing census groups by the criterion of whether the major part of vocational preparation occurs before or after employment; and 2) within these two categories, assigning a general level of skill, using mean training time (SVP). The third step in the analysis is the annotation of occupational groups within clusters, designed to furnish detail on the acquisition of skill.

Before the detailed results are presented, however, there are two topics that demand further discussion--the use of local data for making decisions about training, and the institutional factors that relate to those decisions. In the next two chapters we review the institutional factors. The focus is not on making any one decision, but rather on the observable patterns in industries and occupations, and the underlying rationale for whether training typically takes place before of after employment.

3. PATTERNS OF TRAINING: PRE-EMPLOYMENT

In this century, as formal classroom training before employment has become more common as a means of acquiring occupational skills, on-the-job training has been increasingly informal and limited to learning specific job-related tasks. Structured training after employment has not disappeared; in certain industries and occupations, it remains the only way and in others, an alternative way, depending on local practice. This chapter and the next one deal with the coexistence of these two distinct training patterns.

The growth of pre-employment classroom training reflects the interaction between changes in the occupational structure and the further development of a long-standing vocational tradition in American education.

TRENDS IN THE OCCUPATIONAL STRUCTURE

If we look at the changes in the proportion of major occupational groups since 1900 (Table 2), the most striking shifts are the decline of jobs in farming, domestic service and laborer occupations, and the increase in jobs in white-collar and nondomestic service occupations. We should point out that in the short run, for example in any one decade, technological advance, which is commonly invoked as the source of these changes, may play only a minor role. Since new technology is capital-intensive, innovation takes time to permeate an industrial sector in an already advanced economy. 22/

Over time, however, new methods do take hold. The mechanization of materials-handling alone accounts for a goodly share of the decline in the importance of laborers, and the expansion of the use of farm machinery and fertilizers had reduced farmworkers to 3.0 percent of the labor force by 1977. But new methods are not confined to the introduction of machines. Changes in organizational styles, for example, account in large measure for the relative increases in nonproduction workers, that is, white-collar and service workers.

These trends are usually expressed in occupational terms, but they rest in large part on underlying shifts in the relative importance of industry sectors. The two come together most closely in agriculture where the categories we use make the decline in farming as an industry and farming as an occupation identical. But for the most part, the relative importance of industry growth or decline far outweighs the

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22/ In spite of subsidies, both direct and indirect, the slowness of railroads and steel companies to adopt new technologies has undermined their competitive positions, in the one case against trucking and in the other, against foreign producers.

Table 2. Occupational Distribution of the Economically Active Population, 1900, 1950, 1977 [a]

Major Occupation Group	Percent		
	1900	1950	1977
Total	100.0	100.0	100.0
White-Collar Workers			
Professional, technical and kindred	4.3	8.6	15.1
Managers and administrators, except farm	5.8	8.7	10.7
Sales workers	4.5	7.0	6.3
Clerical and kindred	3.0	12.3	17.8
Blue-Collar and Service Workers			
Blue-Collar Workers			
Crafts, supervisors and kindred	10.5	14.2	13.1
Operatives and kindred	12.8	20.4	15.3
Laborers, except farm and mine	12.5	6.6	5.0
Service Workers			
Private household	5.4	2.6	1.3
Service workers, except private household	3.6	7.9	12.4
Farm Workers			
Farmers and farm managers	19.9	7.4	1.6
Farm laborers and supervisors	17.7	4.4	1.4

[a] The data for these three years are not strictly comparable because of changes in the lower age limit for inclusion (10 in 1900, 14 in 1950 and 16 in 1975) and because of changes in census classifications. The latter yields an overall error of approximately 10 percent, unevenly distributed among classifications. The distributions are presented here only to highlight the gross shifts in the structure.

Source: U.S. Departments of Labor and Health, Education and Welfare, Employment and Training Report of the President. Washington: Government Printing Office, 1976, p. 387 and 1978, p. 206.

changes in occupational mix within industries. 23/ What this means is that jobs go out of style at a much slower rate than the advocates of "future shock" seem to imply.

The cliche that every person will have three or four occupations in a lifetime implies that occupational mobility is largely determined by technical change. In fact, mobility is more a function of maturation than it is of rapid shifts in demand. Young workers often begin full-time labor market participation in low-level jobs and change fields as they perceive better opportunities.

Rapid technological change is also invoked as the chief factor in structural unemployment, leading to a focus on skill obsolescence and the alleged mismatch between job vacancies and the skills of the unemployed. On closer examination, continuing high rates of unemployment turn out to be related to a complex of reasons, including the secular decline of industries, interregional movement of plants, demographic shifts, competition for jobs among demographic groups, and a host of other issues besides the inadequacy of occupational-skill training. 24/

Quite apart from the efficacy of training programs as a solution to employment problems, what concerns us here is the effect of industry shifts on patterns of training. In this respect, the expansion of employment in nonmanufacturing industries, as well as in nonproduction jobs within the goods-producing sectors, is responsible for the extension of the school-based model that has long been dominant in white-collar occupations and is increasing among service occupations.

Classroom training seems particularly attractive when jobs are associated with standardized technical skills. When these skills give workers a claim to special knowledge not shared by the population at large, political opportunities arise to control the occupation through certification or licensing. The movement to "professionalize" occupations has followed the path of the traditional "free" professions--medicine and the law--in using accreditation of training as a means of setting standards and thereby controlling entry. As groups struggle for such control, the connections between the occupational structure and formal instruction are strengthened, and schools at all levels intensify their training commitments.

23/ Jaffe and Froomkin demonstrated this effect statistically for the 1950-1960 decade, a finding we replicated for the 1960-1967 period. See A.J. Jaffee and Joseph Froomkin, Technology and Jobs. New York: Praeger, 1968. Our data are unpublished.

24/ These issues are beyong the scope of this monograph. There is continual disagreement about the root causes of chronic unemployment and a large literature in which the subject is explored. Our views are presented in Marcia Freedman, Labor Markets: Segments and Shelters. Montclair, New Jersey: Allanheld, Osmun, 1976.

While jobs connected to licenses and credentials contribute to the expansion of pre-employment classroom training, at least two other types of occupation have also come to be identified with formal entry requirements: 1) those, such as typist, that require specialized but limited skills; and 2) those where entry is increasingly conditional on possession of a baccalaureate degree, even though occupational skills are acquired on the job. Taken together, training for these three types of jobs has markedly influenced the further development of the vocational emphasis in the nation's schools.

VOCATIONALISM IN AMERICAN EDUCATION 25/

The idea that education is linked to occupational performance goes much further back in American history than the practical preoccupation with "dropouts" and the theoretical flowering of the human capital school, both of which were outstanding landscape features of the 1960s. The idea that education and training might be treated as investments may have its intellectual roots in the "hints and suggestions" of eighteenth and nineteenth century economics, 26/ but its widespread acceptance as a means of interpreting reality, even among those who would not recognize "human capital" by that name, can only be attributed to the instant recognition, in a new and technically sophisticated form, of a long and widely-held set of beliefs.

At a time when America was predominantly an agricultural nation, vocationalism found expression most explicitly in the colleges founded under the Morrill Act of 1862. The establishment of these land-grant institutions grew out of farm pressures, although they were devoted from the beginning to the mechanical as well as the agricultural arts. They served a younger age group than today's colleges, in effect performing the function of a comprehensive high school as we know it.

In 1879, Calvin Woodward established the Manual Training High School of Washington University in St. Louis. The manual training movement had its origins in general curriculum reform, not so much on vocational grounds as in the service of rounding out a liberal education by introducing less abstract subject matter. 27/ After the turn of the century,

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25/ Except as otherwise noted, this section relies on Lawrence A. Cremin, The Transformation of the School: Progressivism in American Education, 1876-1957. New York: Random House, 1961 and Marcia Freedman, "Business and Education," in The Business of America, Ivar Berg, ed. New York: Harcourt, Brace & World, 1968, pp. 364-387.

26/ Blaug, op. cit., p. 827.

27/ Edward A. Krug, The Shaping of the American High School: 1880-1920. Madison, Wisconsin: University of Wisconsin Press, 1969, pp. 23-26. Others have taken the position that the goals of the movement were more pointed toward blacks and the urban poor, "to introduce practicality into schools, preserve traditional values, and enhance industrial progress." See "Introduction," American Education and Vocationalism: A Documentary History 1870-1970. Marvin Lazerson and W. Norton Grubb, eds. New York: Teachers College Press, 1974, pp. 13-14.

the teaching of hand crafts came to be viewed as irrelevant for the rapidly growing corps of industrial workers. As agriculture declined as a source of employment and was overtaken by manufacturing, construction and transportation, pressure developed for the high schools to modernize their efforts to socialize and train working-class youths.

The landmark legislation of this period was the Smith-Hughes Act of 1917, which provided federal funds for vocational education in secondary schools and which, with subsequent amendments, remains a large component of federal aid to education. It is of some significance that business support for the 1917 Act was decisive in its passage. School shops were advocated by educators as an aid to academic instruction, a notion that still has widespread support in educational circles, but the businessmen who advocated the legislation had other goals in mind. They saw vocational education as part of their general anti-union strategy, and looked for example to practical trade training as a means of gaining freedom from the growing regulation of apprenticeship. The National Association of Manufacturers, which by the 1960s was resolved against all forms of federal aid to education, was an early and strong supporter of the establishment of free public commercial and technical schools.

Since 1917, federal legislation has changed the scope of the Vocational Education Act from narrow skill-training in the high schools to broader curricula extending to post-secondary technical education. As things stand now, there remain two overlapping emphases in the secondary schools. One is the continuation of vocational education, and the other is the more diffuse concept of "career education." The latter is a theme with many variations, but it arose in the 1970s out of a renewed effort, almost an echo of earlier movements, to relate public schooling to the "world of work"--to adapt school experiences to practical and occupational ends and, once again, to give "relevance" to the curriculum.

In the meantime, vocational education has gone on--surveyed, studied, attacked, reformed, but always under review. It too has been forced to make obeisance to "relevance," in part through the complex administrative procedures for allocating federal and state funds. The required state and local plans must reflect consideration of local manpower needs, a mandate that is fulfilled in the most perfunctory manner. In practice, vocational education officials prefer locally available demand data to those that are officially produced by Department of Labor agencies, probably with some reason, as we shall observe in Chapter 4. Furthermore, once programs are introduced, they are hard to alter. The weight of the investment in equipment and of the tenure of teachers naturally tends to inhibit rapid changes, but in any case, employment estimates and projections are certainly of little importance in influencing future program decisions. 28/ In effect, the schools continue to offer courses

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28/ D.W. Drewes and D.S. Katz, Manpower Data and Vocational Education: A National Study of Availability and Use. Raleigh, North Carolina: Center for Occupational Education, North Carolina State University, 1975, pp. 40-41.

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of study as long as there is a demand for enrollment, and sometimes past that point. Moreover, they seldom gather information in a systematic way on the acceptability of their programs as credentials for entry jobs.

Only a few students of this subject have dealt with acceptability, 29/ but it is an important concept for assessing all forms of occupational training. At the secondary school level, for example, employers may be more or less enthusiastic about the quality of the training, but they seldom quarrel with the idea that high school is an appropriate locus for the production of office clerical workers. Similarly, courses in cosmetology and practical nursing are acceptable insofar as students are prepared for success in gaining state licenses.

For other occupations, the record can only be judged locally. Through the network created by advisory councils, vocational education can point to many examples of school-industry cooperation in establishing and modifying the curriculum and in creating a bridge from vocational school to work that is satisfactory to all parties. But there are just as many, if not more, instances when local educational authorities know little about the specific outcomes of their programs in terms of students' post-high-school employment experiences.

THE POSTSECONDARY SECTOR

Insofar as pre-employment training is an accepted route for skill acquisition, it is more and more the province of postsecondary institutions--professional schools, two- and four-year colleges, area technical schools and proprietary trade schools.

Higher Education. In theory at least, the higher learning of earlier centuries was not supposed to inculcate vocational skills. But in contrast to Britain, where the idea persists that the classically trained person is the best prepared to exercise leadership in a variety of settings, the trend in American higher education mirrors the emphasis of the public schools on the contribution to economic growth of technically trained human resources. In coining the word "multiversity," Clark Kerr sought to legitimate a pragmatic role for higher education, a role that he viewed as "an imperative rather than as a reasoned choice of elegant alternatives," 30/ and one that was fully consonant with the investment metaphor of human capital theory.

The practical results are readily apparent from data on degrees granted. Almost half (47 percent) of the 1.3 million degrees (bachelor's, master's and Ph.D.s) earned in 1975 were in the fields of business,

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29/ Manuel Zymelman in one of these few. See Zymelman, op. cit.

30/ Clark Kerr, The Use of the University. Cambridge, Mass.: Harvard University Press, 1963, p. 6.

engineering, education and health alone, 31/ in addition to some 56,000 first professional degrees in medicine, law and theology. 32/

It is worth noting that, from time to time, there is a reaction against what might be called "excessive vocationalism." Thus, a 1978 report by the National Advisory Commission on Higher Education for Police Officers concluded that the Department of Justice's Law Enforcement Education Program, established in 1968, had resulted in encouraging police personnel to attend college for courses that were "teaching what the police do now instead of inquiring what they could do differently." The Commission recommended that police departments should recruit the educated, rather than educating the recruited and that the education of criminal justice majors be broadened, with the practical skills of police work taught in police academies rather than in colleges. 33/

RELATIVE NUMBERS OF TRANSFER AND TERMINAL DEGREES

The total number of associate degrees and other awards granted by two-year colleges and technical institutes (including hospital-based schools) for completion of organized occupational curricula was about 277,000 in 1975, far short of occupationally-oriented baccalaureate, graduate and professional degrees. The awards, most of which were for programs of at least two years, were distributed by field as follows: 34/

Total	100.0%
Mechanics and engineering technicians	6.5
Health services	27.7
Data processing	2.8
Business (including secretarial)	29.9
Public service (including law enforcement)	12.7

These figures reflect the extension of postsecondary training into fields for which pre-employment training has traditionally been acceptable, like secretarial work, as well as the movement of local institutions into

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31/ U.S. Bureau of the Census, Statistical Abstract of the United States: 1977. Washington: Government Printing Office, 1977, Table 266, p. 161.

32/ National Center for Educational Statistics, Digest of Education Statistics, 1976, Table 114.

33/ Lawrence W. Sherman and the National Advisory Commission on Higher Education for Police Officers, The Quality of Police Education. San Francisco: Jossey-Bass, 1978. These findings are reminiscent of long-time criticisms of the practice of granting salary increments to teachers for extra graduate credits. In this case, where the federal government has invested over $225 million, the report questions the assumption that time spent in college classrooms warranted the promotions and salary increases received by thousands of police personnel.

34/ Digest of Education Statistics, 1976, op. cit.

providing classroom training for occupations in health, police and corrections. Once having been established, a community college will seek a clientele made up of diverse agencies--local government, for which it is a natural supplier of training; hospitals that can no longer afford to operate their own schools; and even apprenticeship programs where related classroom training has long been conducted at the local high school. 35/

The success of these public intermediate institutions in expanding their occupational curricula pales in comparison with the growth of training in noncollegiate postsecondary schools. For 1978, the National Center for Educational Statistics reported on 667 of these in the public sector and 5,864 in the private sector. 36/ Comparative enrollment figures show that the private, largely proprietary, schools enroll more than twice as many students as the publicly supported schools (Table 3). NCES uses "type of school" to report these data; a categorical scheme that obscures the curricular content, particularly in the public sector where most students are enrolled in "vocational/technical" institutions. Among the private schools, however, the business schools accounted for a major share (41 percent) with trade schools (15 percent) and cosmetology/barber schools (14 percent) next in importance.

The NCES also furnishes estimates of completion rates and average fees for occupational training programs. The 1975 data showed that, excluding correspondence schools, the completion rate for the private sector averaged 62 percent compared to 50 percent for the public sector. For mean number of hours to complete the program, the figures were 947 for the private, and 1,499 hours for the public. Tuition data showed that public courses, although longer, were cheaper in direct costs to students--$342 compared with $1,748 for proprietary, and $1,106 for private nonprofit schools. 37/

Considerable controversy has surrounded the proprietary schools in recent years. The logic of their supporters is clear enough: since they derive their income from the market, they can maximize their profits only by doing a better job of preparation than their competitors for a given cost. To do so, they must employ the best teachers to train students in the tasks dictated by the labor market, and if their placement rates are unsatisfactory, they will lose their position in

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35/ See American Association of Community and Junior Colleges, Organized Labor and Community Colleges. Washington: The Association, 1976. For a series of brief essays on the training role of community colleges, see "Easing the Transition from Schooling to Work," Harry F. Silberman and Mark B. Ginsburg, issue eds., New Directions for Community Colleges, 16 (Winter 1976).

36/ Preliminary data to be published in NCES annual report, The Condition of Education. Precise figures on private proprietary schools are hard to pin down. Some estimates run as high as 10,000.

37/ NCES, The Condition of Education, Vol. Three, Part One, Table 3.12, p. 185.

Table 3. Enrollment in Noncollegiate Postsecondary Schools with Occupational Programs, 1978

Type of School	Public		Private	
	Enrollment	Percent Full-Time	Enrollment	Percent Full-Time
Total	405,904	61.6	871,281	70.3
Vocational/Technical	378,466	61.6	26,929	82.9
Technical Institute	10,637	3.8	19,288	82.0
Business/Commerical	-	-	361,413	67.1
Cosmetology/Barber	-	-	124,359	82.1
Flight	-	-	60,773	22.4
Trade	800	100.0	134,038	75.8
Arts and Design	-	-	35,631	71.2
Hospital	6,152	100.0	51,518	99.3
Allied Health	9,849	95.4	33,886	86.8
Other	-	-	23,446	16.5

Source: Prepublication data, National Center for Educational Statistics.

the market. While these assumptions may be valid for some schools, they surely are not for all schools.

One major difference among proprietary schools is the extent to which they rely on public subsidies through grants and low-interest loans available to their students. A large number came into being in response to the demand created by the GI Bill after World War II. Their eligibility to become lenders under the Guaranteed Student Loan Program was established in 1968, and they became full partners in the "postsecondary community" in 1972 when their students became eligible for the same basic grant aid as college students. The abuses attendant on their participation in subsidy programs 38/ are interesting, not because they are scandalous, but because the attempt to reduce "the imperfections of capital markets, which inhibit some individuals from financing their desirable occupational choices," 39/ had the unintended effect of enhancing the imperfections of the market for occupational training.

The distortion occurs because public grants and loans encourage people with little labor market information to enroll in programs for which the payoff is highly questionable. On this issue, the Bureau of Consumer Protection of the Federal Trade Commission summarized its record of hearings by characterizing the typical vocational student as "unually vulnerable to deceptive and misleading advertising and unfair sales and enrollment techniques," as either unemployed or earning low wages, and as motivated by the desire to escape from this situation while lacking both labor-market information and insight into his or her own potential. 40/

The U.S. Office of Education, while attempting to deal with such abuses, has inherited a sizeable financial problem from the past. Twenty-one percent of all federally insured guaranteed student loans for fiscal 1975 was made by proprietary schools in their capacity as lenders. 41/ The default rate for these students runs more than twice

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38/ For a partial record of these abuses, see Bureau of Consumer Protection, Federal Trade Commission, Proprietary Vocational and Home Study Schools: Final Report to the Federal Trade Commission and Proposed Trade Regulation Rule. Washington: Government Printing Office, 1976 and U.S. Senate, Hearings Before the Permanent Subcommittee on Investigations of the Committee on Government Operations, Guaranteed Student Loan Program, Part 2 (December 10 and 16, 1975). Washington: Government Printing Office, 1976. For a critique, see Ivar Berg and Marcia Freedman, "Student Loans and the Labor Market," National Technical Information Service, 1978.

39/ The wording is Blaug's op. cit., p. 839.

40/ Bureau of Consumer Protection, Federal Trade Commission, op. cit., pp. 37-38.

41/ U.S. Office of Education, Office of Planning, Budgeting and Evaluation, Executive Summary, Planning/Evaluation Study. A Survey of Lenders in the Guaranteed Student Loan Program. July 1976.

as high as for students attending colleges and universities. 42/ As of February 1978, the Secretary of Health, Education and Welfare reported to the Congress that former students had defaulted on a total of $500 million in federally guaranteed loans. Although greater publicity has been given to willful defaulters with good jobs, an analysis showed that most of the debtors were not ungrateful college graduates, but high school dropouts or graduates who had enrolled in vocational school to learn specific skills. 43/

In institutional terms, public proprietary schools have similar strengths and weaknesses. Placement in training-related jobs is probably the only immediate test of success. As the Federal Trade Commission Report points out, the right course at the right school enhances the probability of success, while the wrong course or school makes a graduate's chances very slight. "As it now stands, the prospective enrollee really has no way of knowing which is which." 44/

In this context, the "right school" is one that selects students who can benefit from the program and attempts to do an honest training job. The "right course" is one that is acceptable to prospective employers. According to these criteria, proprietary schools have their greatest overall success in the clerical and cosmetology fields, in much the same degree as the public secondary schools. They are also increasingly involved in training for the myriad of specialized occupations in the health field. In the so-called "trades," the record is more spotty. Individual schools that teach auto mechanics and welding, for example, have fine local reputations, while, by and large, those that purport to teach computer programming and truck driving are more suspect. The point here is not that courses are offered by any particular kind of school, but rather that standards based on better information are required.

It should be added here that correspondence schools, whose enrollments run about 330,000 at any one time, have no measurable labor market effect. For a sample of veterans, one study that was on the whole quite favorably disposed to proprietary schools found that correspondence courses yielded no earnings gains. 45/

Otherwise, comparing the placement records of public and private vocational schools shows few differences. W.W. Wilms found that graduates of both types who trained for higher-level technical occupations were less likely to find jobs in their fields, while trainees for lower-level

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42/ Ibid.

43/ "U.S. Cites Students' Privacy Rights in Delaying Move on Loan Defaults," The New York Times, February 12, 1978.

44/ Bureau of Consumer Protection, Federal Trade Commission, op. cit., p. 229.

45/ Dave M. O'Neill, "Voucher Funding for Training Programs: Evidence from the GI Bill," The Journal of Human Resources, XII (Fall 1977), pp. 425-446.

clerical and service-worker positions--including secretarial and cosmetology students--were more likely to find jobs in their fields. 46/ In a followup study, Wilms found that for both kinds of schools, dropouts training for upper-level occupations did just as well in terms of placement and earnings as those who completed the full program, but that trainees for lower-level occupations who completed their courses did better in the labor market than dropouts. 47/

Wilms' study is often interpreted as antithetical to proprietary schools. What is closer to the mark, however, is a comment from some of his critics, which in fact adds to rather than detracts from his findings:

> Occupational differences and characteristics of the labor market may have been more important in explaining variations in job outcomes than such factors as the quality of the training or the placement services provided by the schools. 48/

Ultimately, the most important external factor in the success of all occupational curricula is a linkage between training and employing institution. The graduates of certain schools form a steady labor supply for certain employers who may work in close partnership with the school in such details as curriculum revision. Where this relationship is poorly developed, student prospects are uncertain, even when openings may be available in the occupational categories for which they were trained. On the other hand, a tie between school and employer can overcome other deficiencies. The futility of schools for truck-driving has been adequately demonstrated, but we know of at least one such school that has considerable placement success, not because of the training it gives, but because the proprietor is an ex-driver who uses his union connections to refer students to job openings.

SUMMARY

The amount of time and resources devoted to formal pre-employment training in classrooms has continually increased. Over the last century, there has undoubtedly been a rise in the technical level of the entire occupational structure and a concomitant rise in the basic literacy requirements for many jobs. The average years of schooling among the population has also increased, while the tradition of vocationalism in American education has, if anything, grown stronger.

46/ Wellford W. Wilms, Public and Proprietary Vocational Training: A Study of Effectiveness. Berkeley, Calif.: University of California, Center for Research and Development of Higher Education, 1974.

47/ Wellford W. Wilms, Vocational Education Dropouts: A Study in Social Mobility, 1979 (in press).

48/ Carnegie Council on Policy Studies in Higher Education, The Federal Role in Postsecondary Education. San Francisco: Jossey-Bass, 1975, p. 57.

The expansion of the higher-education system, beginning in the 1950s, included the creation of a third tier of community and junior colleges and technical institutes to supplement the opportunities available in universities and in four-year colleges. 49/ While the majority of students in these new institutions were enrolled in "transfer" curricula designed to gain admission into four-year colleges, a number completed so-called "terminal" programs. These programs, designed to prepare students for particular occupations, became part of the two-year college scene, partly as a reflection of their search for a raison d'etre, and partly in an effort to upgrade traditional vocational education. The programs also responded to labor market changes--the age rationing that made high-school graduates less employable in certain sectors of the economy and the movement toward credentialling and licensing that in turn encouraged the standardization of qualification and training.

Meanwhile, the postponement of entry into full-time employment of young workers lowered the opportunity costs of attending school. The idea that education and training would insure access to rewarding employment gave way to a somewhat more problematical rationale--that without education or training, individuals would be in a poor position to compete for available opportunities.

Continuing high rates of unemployment, which lowers opportunity costs, encouraged training policies and programs designed to improve the match between people and jobs. Finally, the spread of governmental grant and loan programs, extended not only to students enrolled in traditional institutions of higher education, but also to those in proprietary schools, lowered the opportunity costs to potential students even further.

With all of these developments, pre-employment training has by no means swept the field. There remain a sizeable number of occupations for which major skill acquisition takes place after employment. It is to these kinds of jobs that we now turn our attention, keeping in mind that people of varying backgrounds and already acquired skills can be hired and are often preferred to fill existing vacancies.

49/ Many of the latter, which had been teacher training institutions, were transformed into major regional outposts of the state university system.

4. PATTERNS OF TRAINING: POST-EMPLOYMENT

Counter to the broad trend toward formal pre-employment training, other patterns for skill acquisition persist in which training takes place only after the worker is hired. The occupations for which training is inextricably tied to the job are characterized by industry- or firm-specific skill requirements. Such occupations require credentials for entry, but of a more general character, such as a high school diploma or a baccalaureate degree. Beyond additional formal or informal screening criteria, as for example, aptitude tests, the most important aid to entry may well be information - about the jobs and hiring practices of the firm - or a personal introduction from someone already on the payroll.

We are accustomed to viewing the conduct of a business as a purely rational enterprise that includes careful allocation of resources and even long-range planning, but for personnel activities, a well-thought-out response to changing conditions is more often found in textbooks than in practice. As Arnold Weber has put it, "Although management's approach to capital projections borders on reverence, it generally views personnel planning from the same perspective as a sailor on overnight leave in Marseilles." 50/

Spurts of planning activity do occur, especially as the result of exogenous pressures. In recent years, the personnel function has been vastly enhanced by the federal government's anti-discrimination activities, which require not only the establishment of affirmative action goals, but also new hiring systems and special training programs. 51/ By and large, however, corporate planning for human resources utilization is a high priority only for managerial and professional personnel. This focus, and the contrasting attitude toward rank-and-file workers, is illustrated by a sample of narrative responses to a Conference Board Survey on "evolving systems in manpower planning":

> The Hewlett-Packard Company whose strength is described as lying in its professional workforce, consequently focuses its planning on that segment. A major division of Scott Paper" ... has never experienced a problem in obtaining either production workers or salesmen, so there are no long-range plans for recruiting these employees." 52/

The long-range planning considerations of Union Oil revolve around the managerial and professional segments. The nonmanagerial work force has been decreasing, and shortages of competent personnel have not been a serious problem. Furthermore, the company contracts out a great deal of nonsupervisory work. 53/

50/ Wall Street Journal, January 30, 1978, p. 14.

51/ Herbert E. Meyer, "Personnel Directors are the New Corporate Heroes," Fortune, February 1976, p. 88.

52/ Walter S. Wikstrom, Manpower Planning: Evolving Systems. New York: The Conference Board, 1971, p. 37.

53/ Ibid., p. 52.

Needless to say, companies with fewer than 500 employees almost never engage in personnel planning at any level. The absence of long-run plans (even if long run is defined as five years) make it difficult to assess how much training is going on at any one time or how much is likely to take place in the future. Companies themselves seldom keep the records or gather the data that would be necessary for reliable estimates on a current basis. 54/ In a recent survey, only about half of the respondent firms provided in full the requested expenditure data.

> Volunteered comments suggest that most of the companies that did not furnish this information were unable to do so - because education-training costs were "buried" in other budgets, were "scattered" in a number of company locations and departments, or both. 55/

The accounting problems associated with direct expenditures are only part of the problem. More generally, it is easier to describe a model for determining the relative costs of training than to estimate the terms of its equations. The direct costs over a given unit of time, the wage rate of the trainee, and the value of production attributable to the trainee are relatively simple variables. More complicated are those that seek to capture the future contribution of the company-trained skilled worker.

Everyone agrees that firms are more likely to offer training when the labor market is noncompetitive, that is, "... when the workers have training that is specific to the firm or in the case of monopsony when the firm is the sole employer for a segment of the labor market." 56/ It is this relationship that insures structured training at IBM and AT&T, in contrast to firms in other, less concentrated industries where forecasting the length of time over which training will be useful is subject to a high degree of uncertainty.

When they were asked directly their reasons for providing training, employers in four metalworking industries most frequently responded with the general statement that "necessary job skills could best be learned through the employer's own training program." Among the reasons for not providing structured training, over half the firms reported satisfaction with informal methods.

54/ Lusterman, op. cit., p. 11.
55/ Ibid., p. 16.
56/ Zymelman, op. cit., p. 32 and Lusterman, op. cit.

- Relatively few establishments were influenced by the following reasons: Cost of structured training is prohibitive; the risk of training employees and losing them to other firms is too great; or the production process shifts tasks away from skilled to lesser skilled workers who are already available. 57/

Logically, one can assess costs and develop models for comparing different training modes. Such comparisons however, would only be useful under certain conditions. First, there has to be a real possibility of choice; second, the output of the training process must be the same wherever it is located; and third, other institutional constraints are absent. Since all of these conditions are seldom met in the U.S. with fragmented but highly developed systems, cost minimization usually does not determine the choice of training if only because the calculations cannot be very precise.

It may well be that businessmen, taken as a whole, make their decisions by employing the calculus of marginal productivity, thus operating on the theoretical principles of microeconomics, but only in the same sense that Moliere's Bourgeois Gentilhomme discovered that, unwittingly, he had been speaking prose all along. This is the burden of the argument presented by Fritz Machlup in his Presidential Address to the American Economic Association: marginalist theory does not require that information on supply, production and demand be correct as long as change is registered correctly. Furthermore, firms act as profit-maximizers even if they cannot make exact estimates and calculations. 58/

As far as training is concerned, a decision may or may not be sound, but it is usually made either out of intuition or out of a rough assessment of past practice, rather than as the result of a formal exercise in microeconomics. Thus, small companies may feel unable to afford the short-run costs of training if the longer-run benefits are uncertain. At the other extreme, large firms may feel that, within limits, costs are warranted, not because there is no alternative, but as part of an overall investment strategy. This, again, seems to be the case in dealing with those managers and professionals whom the firms considers critical to the success of the enterprise. The "... 'need' to assure occupational vitality - morale, in the sense of commitment to work" - is typical of a long-run justification of the costs of training for these employee groups. 59/

57/ U.S. Department of Labor, Occupational Training in Selected Metalworking Industries, 1974, BLS Bulletin 1976, ETA R&D Monograph 53. Washington: Government Printing Office, 1977.

58/ See "Theories of the Firm: Marginalist, Behavioral, Managerial," American Economic Review, LVII (March 1967), pp. 1-33.

59/ Lusterman, op. cit., p. 6.

In general, company involvement is far less in the training of new employees than in the training of present employees, and it is the largest firms, concerned about a "core of ongoing needs" in the managerial and supervisory areas of their operations, that maintain continuous offerings of courses and programs. 60/ For workers in other occupational groups, industry places most reliance on informal methods of learning-by-doing:

> Most of the training of new employees occurs on the job, and much of that is relatively unplanned ... many companies that provide courses for employees are shortening or deferring them, placing greater reliance on on-the-job experience... 61/

The prevalence of informal training has both cyclical and secular causes. In recent years, employers have had little difficulty in finding skilled workers, either within the firm or in the labor market. Their consequent lack of concern for planning and training is the burden of Weber's complaint about managerial shortsightedness cited earlier.

In secular terms, the increase of jobs at both ends of the skill distribution contributes to the growth of informal training. Jobs with specific but limited task requirements, such as those held by assembly workers, stock and shipping clerks, and cashiers, require varying degrees of physical strength, concentration and basic literacy, but their purely occupational skills can be learned in a short time. Taken together, these jobs constitute more than a third of U.S. employment (see Table 1.1). At the other extreme, new hires with extensive pre-employment training or long experience may need no more than brief orientation on the job.

Given these patterns, it is not surprising that while formal in-house education and training activities are provided by 75 percent of all companies with more than 500 employees, participation of all employees in these firms was estimated at about 13 percent in the Conference Board survey. 62/ This average figure, however, obscures the difference in levels of training activity by industry. Firms in banking, insurance, utilities, transportation and communications are, in fact, above-average spenders for education and training programs.

For some of these industries, the reasons for company-based training are apparent. In communications, the telephone sector, which is the

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60/ Ibid.
61/ Ibid., p. 46.
62/ Ibid., p. 11. The study sampled firms with 500 or more employees, representing about half of the nonagricultural work force in the private sector.

largest employer, is dominated by the Bell System. Only one other company, General Telephone, has a position in the industry. In any case, wherever these companies operate, they are in effect monopolies with unique equipment and services. Utilities also are local monopolists, and while their training methods vary more, they also require a certain amount of structure in training for such occupations as highly-skilled power-station operators.

In the insurance and banking industries, the predilection for training is partly explained by the necessity to carry out routine procedures in an orderly way. This is especially true in banking where an unusual proportion of the total effort is devoted to new employees, with the typical case the one to three weeks devoted to the training of tellers. In the insurance industry, it is likely that there is less overall emphasis on low-skill entry jobs and more on technical areas like data processing and the skills required by investigators, adjusters, and sales agents.

Transportation again is a case that combines the necessity for precision in the operation and servicing of unique capital equipment and the routinization of other, mainly data-processing and clerical, functions.

More detail on specific occupational training patterns will be found in the appendices to this monograph. The important point to be made here is that in the variety of patterns for skill acquisition, formal, structured training on the job for the production of high-skilled workers occupies a small space. The point is well illustrated by the current status of apprenticeship, the best-known of the formal routes to high skill.

APPRENTICESHIP

On the face of it, apprenticeship appears to be the ideal form of structured training: because it is firmly based on the employer-employee relationship, work and training are inseparably linked; apprentices are paid at an increasing rate designed to match their increasing productivity; and the related classroom training, together with supervised work experience, produces a fully rounded craft worker capable of performing all of the related tasks of the occupation. In spite of these benefits, apprenticeship has held a minor place in skill acquisition in the United States. A 1977 estimate juxtaposes an average annual enrollment of 50,000 new apprentices with a projection of 400,000 craft openings per year in the next decade. 63/

63/ Ernest G. Green, "Expansion Plans for the Fifth Decade," Worklife, 2 (August 1977), p. 5.

In the last two decades, the proportion of craft workers has remained relatively stable, but the number of apprentices in training at the beginning of each year fluctuates markedly. The number generally declined during the fifties and more in the sixties, but the 73 percent increase from the 1962 low to the 1976 high was on a base of only 155,649. 64/

Since construction crafts account for about 60 percent of apprentices, the reasons for the weakness of apprenticeship as a system are related to the problems of that industry. While apprenticeship need not depend on the existence of a union-management agreement, in practice nonunion efforts are rare. Therefore, since the homebuilding sector of construction is unorganized, apprenticeship is confined largely to contract construction where the building-trades unions are strong. Unfortunately, the entire industry is subject to large cyclical swings in employment. When unemployment increases, the number of entering apprentices declines; when unemployment decreases, the number of new apprentices increases. Completion rates behave in a contrary fashion; they go up when unemployment rises and down when unemployment falls.

This relationship affects all programs; apprentices are not hired (or may be laid off) in a loose labor market, just when they would prefer to remain until completion, and they are hired (or kept on) in a tight labor market which encourages them to seek employment as a journeyman before they finish their formal training. 65/ As a result, the annual number of apprenticeship cancellations, which may be due to layoff or to quits, is of the same magnitude as completions. In January 1976, for example, about 266,000 apprentices were in training. They were joined by 88,000 new registrants during the year. Both completions and cancellations were about 50,000, leaving 255,000 in training at the end of the year. 66/

Government policies directed toward this mismatch have taken the form of demonstrations to continue the training of unemployed apprentices off the job. So far, however, there have been no subsidies for apprentice stipends. The Bureau of Apprenticeship and Training of the Department of Labor has created several initiatives in recent years to expand apprenticeship outside construction. In 1977, for example, the Department of Labor contracted with the National Automobile Dealers Association for $1.3 million to cover the development and recruitment costs for a program in auto mechanics apprenticeship designed to recruit and train 13,000 persons a year.

64/ U.S. Department of Labor, Employment and Training Report of the President, 1977. Washington: Government Printing Office, 1978, Tables A-3 and F-14.

65/ David Farber, "Apprenticeship in a Changing Economy," Manpower, 7 (September 1975), pp. 31-33.

66/ Ben Burdetsky, "The 'Marshall Plan' to Meet New Needs," Worklife, 2 (August 1977), p. 23.

Attractive as it is in theory, the extension of apprenticeship is probably limited by the reluctance of employers to engage in long-range planning, on the one hand, and the desire of unions to control the number of fully-rounded craft workers, on the other hand. Apprenticeship is strongest in trades like electrical work, plumbing, air-conditioning and sheetmetal work where skills are most difficult to pick up informally. In other crafts, nonapprenticeship sources of skill acquisition are more important. To control their jurisdiction, therefore, unions employ a variety of devices to admit members outside of apprenticeship. When labor markets are tight, workers may be upgraded from helper or laborer categories or admitted as journeymen when unions organize nonunion shops. 67/

Ray Marshall and his colleagues found that completed apprentices in the building trades fared better in the labor market than workers trained in other ways. 68/ Outside of construction, the evidence is not so clear. Horowitz and Herrnstadt found little difference in the career outcomes of tool and die makers who had trained as apprentices and those who had not. 69/ The two conclusions may not be incompatible, given the different nature of the occupations. Workers in the building-trades crafts probably vary more in overall skill than tool and die makers. One may infer that workers who never qualified for the latter occupation because they did not achieve the overall excellence required were not available for comparison.

In any case, apprenticeship as a training mode seems destined to have a low ceiling with respect to expansion. To get an idea of its scope at present, it is of some interest to compare two figures from 1975. In that year, apprentice completions were about 46,000, while almost 21,000 legal immigrants were classified as craft workers. 70/

PROBLEMS IN EXPANDING STRUCTURED OJT

Available information on industry practice suggests that for many occupations, training takes place after the worker is actually on the job. The bulk of this learning-by-doing is informal and tailored to the specific context. Structured, that is, formal training programs are more likely to exist in the larger firms of an industry (apart from contract construction), but except for the trades that are critical for the continuity of the enterprise, the occupational content of training programs is limited.

67/ Ray Marshall, William Franklin, and Robert Glover, "Paths to Construction Journeymen," Manpower, 6 (September 1974), p. 9.

68/ Ray Marshall, Robert W. Glover, and William S. Franklin, Training and Entry into Union Construction, Manpower R&D Monograph 39. Washington: Government Printing Office, 1975.

69/ Morris A. Horowitz and Irwin L. Herrnstadt, Learning the Tool and Die Maker Trade. Manpower Research Monograph No. 17. Washington: Government Printing Office, 1970.

70/ Burdetsky, op. cit., p. 23; and U.S. Department of Justice, Annual Report, Immigration and Naturalization Service. Washington: Government Printing Office, 1976, Table 8A.

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Where small firms perform a significant role in the industry, special problems arise. Consider, for example, the complexities of skill acquisition among machinists. In a survey conducted by the Bureau of Labor Statistics in selected metalworking industries, machinists accounted for about one-quarter of all trainees. Fewer than half were in apprenticeship. About two-thirds were in "qualifying" training (including the apprentices) and one-third in "skill-improvement" training. Firms with 1,000 or more employees accounted for 44 percent of structured training. 71/ The fact that small firms are less likely to engage in training creates a special problem because the critical activity of producing machine tools is typically organized in job shops. The owners themselves are likely to have been trained in large firms and from their point of view, these same firms constitute a natural source of supply for skilled workers. The large firms are willing to bear the training costs, but are naturally unwilling to engage in training with the expectation that their people will be pirated away. This type of problem is endemic in Connecticut, 72/ where the concentration of metalworking firms makes it readily apparent, but it is likely to exist in other places and other industries.

In spite of the difficulties and the decreasing willingness of employers in some industries to incur the disruptions attendant to training if they can be avoided, on-the-job training remains an attractive option to workers who can look forward to upward mobility through a progression of jobs, each involving small increments of skill. 73/ And it is especially attractive to planners of programs for training and placing the disadvantaged or the underemployed.

The notion of involving the private sector by subsidizing on-the-job training comes up repeatedly. We will have more to say about the policy issues in such initiatives. Here we want to point out the complex requirements for encouraging industry involvement in training by describing an exemplary program, "Training and Technology" (TAT) operated by the Oak Ridge Associated Universities in eastern Tennessee. 74/ TAT is a pre-employment training program located in a government-owned nuclear plant that is operated by Union Carbide. It is akin to company-based vestibule training, except that the training period is longer than

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71/ For details, see Note on Metalworking and Machine Trade Occupations, Appendix D-3.

72/ For details, see Appendix D-3.

73/ U.S. Department of Labor, On-the-Job Training: CETA Program Models. Washington: Government Printing Office, 1977, p. 1.

74/ Information comes from U.S. Department of Labor, A Model for Training the Disadvantaged: TAT at Oak Ridge, Tenn. Manpower Research Monograph No. 29. Washington: Government Printing Office, 1973, and personal communications from Wendell Russell of TAT and Charles Phillips of the Employment and Training Administration, U.S. Department of Labor.

customary (six months) and the trainees are placed not only with Union Carbide but also with other firms.

TAT owes its existence in the first instance to the support of Glenn Seaborg who was head of the Atomic Energy Commission and thus had the leverage to convince the middle managers of a federal contractor of the program's feasibility. The effort was substantially aided by the contribution of start-up costs from the U.S. Department of Labor.

Trainees are carefully selected from a pool of applicants that averages about 10 for each place in the program. The entrance requirement that seems most important for success is (at a minimum) a sixth-grade reading level. While initially the target group was the "disadvantaged," since 1974 it has been the unemployed and the underemployed, including high school graduates in low-skilled, dead-end jobs.

Trainees are referred and supported by local CETA program operators; the program is national in scope, but in the event, most trainees are from eastern Tennessee. The most recent data show a direct average cost per trainee of about $2,690, which includes supportive services such as locating housing, transportation and recreation and help with personal, medical or financial problems. Trainees also received stipends and allowances for their dependents.

TAT maintains close contact with major employers in the Southeastern region and tailors its course offerings to their specifications. The occupations for which training has been carried on since the beginning of the program in 1966 are metal-machining, welding, physical testing and mechanical operations (which includes some aspects of sheet-metal layout, pipefitting, welding and millwrighting). Other courses are added or subtracted from this core list. Drafting is now in the program, while industrial electricity, glassblowing, chemical technology, machine-shop inspection and electronics were phased out as demand for these skills dropped. The list of occupations includes those, like welding or drafting, that are usually taught in pre-employment classes, as well as those, like metal-machining, that are more likely to be acquired on the job.

The unique feature of TAT is the factory setting. Trainees are treated like employees, subject to plant rules and discipline. They spend 40 hours a week in training, about three-quarters in "hands-on" use of production equipment, and about one-quarter devoted to related instruction in math, science and blueprint reading. Their performance of shop tasks is judged by industrial standards.

When the program began, the training time was one year. Later it was reduced to six months, possibly because stricter criteria for selection were introduced. It is hard to compare every course with a standard measure, but the length of the training period seems generally higher than in customary industry practice. Welding, for example, is usually taught in courses lasting 12-16 weeks rather than the 26 weeks at TAT. The program operators suggest that the longer time is necessary

because of the broad range of equipment and techniques and the greater versatility of the worker who completes training. In any case, since the purpose of the program is to train workers who would otherwise not be eligible for employment in these occupations, the additional time may be viewed as a necessary condition of success.

TAT has perhaps the best reputation for effectiveness of all special training programs ever undertaken, but its expansion has been slow. Although training is now done at a few other sites, most of it is still concentrated at Oak Ridge. By 1979, TAT had produced 4,000 graduates. While the program demonstrates what can be done with a selected population under optimum circumstances in a stretched-out curriculum and at relatively high cost, the unusual conditions for its success help to explain the difficulties in persuading employers to lower selection criteria for the purpose of tapping a different pool of workers than is customarily available.

SUMMARY

For a large number of jobs in the economy, skills are routinely larned after employment. About 37 percent of all jobs require less than three months experience for standard performance, and training problems in these areas are largely connected to the quality of supervision. But for higher-skilled jobs, and especially for the highly-skilled blue-collar crafts, the training picture is confused and confusing.

There is no standard American way of becoming a craftworker. One may acquire skills in the training system of another country and be fully qualified for employment in the United States. One may learn through informal job progression, or through apprenticeship or through briefer structured training. While a number of unions have opposed the expansion of apprenticeship, the larger problem lies in the short-run perspectives of employers, particularly those in small establishments. In a period of loose labor markets, the need for training in a depressed industry like construction is less acute--the requisite skills seem always to be available. But the lack of forward planning can create serious bottlenecks in a critical but volatile sector like the manufacture of machine tools.

In general, long-range personnel planning is confined to managers and professionals. Large firms accept the necessity for training on an ad hoc basis. They prefer to limit the length and the content of their formal programs, but longer training is acceptable to produce the core of highly skilled workers necessary to maintain operations. If a large firm feels that on-the-job training is the best way to impart skills, then it will undertake training without undue concern about costs.

This unsystematic approach to skill acquisition--perhaps better described as systematic within severe limits--has a long tradition. As the occupational structure has shifted, the demand for craft workers has leveled off. But the very emphasis on "newer" occupations and the enormous increase in college-going has left certain skilled trades relatively unattended to.

Even high unemployment does not obviate complaints about unmet needs for skilled workers. It is hard to tell how serious a given problem is when the complainants remain loathe to take action. If demographic changes in the next decade makes the pool of entry workers smaller, employers may be confronted with true job vacancies that cannot be filled within the short lead time to which managers have become accustomed.

5. DATA SOURCES ON THE SUPPLY AND DEMAND FOR LABOR

In contrast to the private sector where personnel planning is lackadaisical and training decisions are made on an ad hoc basis, many agencies in the public sector are mandated by law to submit plans designed to justify their activities. This asymmetry contributes to the problems of definition and dialogue discussed in Chapter 2; it also affects and is affected by issues in the gathering and dissemination of information, both on the demand side (related to the number of job openings) and the supply side (related to the number of available workers). Those who are responsible for the delivery of training programs have available a plethora of statistics generated by the federal government and the states. In this chapter we turn to a discussion of the issues surrounding the use of these data for making decisions about training.

LABOR STATISTICS

Data series relevant to labor are collected in 16 federal agencies. 75/ The Bureau of Labor Statistics (Department of Labor) alone conducts some 18 programs in addition to its publications based on the Bureau of the Census's Current Population Survey. 76/ The United States produces the largest quantity of reliable data in the world, but the production of these data is complicated by the very size of the nation and the large variation in state and local practices. At issue are the number of statistical programs, the accuracy of the data, the timeliness of publication, the level(s) of aggregation, and the need for series that are both useful and integrated.

This happens to be a period of flux and transition in the labor statistics field. Attempts to reformulate programs are going on in many agencies at the same time that a national commission (established in 1977) is carrying on a one-time, comprehensive review of employment and unemployment statistics. By Congressional mandate, the Commission is directed to consider a formidable list of topics, including three that are of particular interest here:

> (K) The availability of and need for periodic information on education and training enrollments and completions in the public and private sectors.
>
> (L) Statistical indicators of the relationship between education and training and subsequent employment, earnings, and unemployment experience.

75/ "Labor Statistics: A Framework for Planning U.S. Federal Statistics, 1978-1989 (Draft Chapters)," Statistical Reporter, No. 77-7 (April 1977), pp. 231-233.

76/ U.S. Department of Labor, Handbook of Labor Statistics 1977. Bulletin 1966. Washington: Government Printing Office, 1977.

(N). The availability of and need for current and projected occupational information, particularly on a local basis, to assist youths and adults in making training, education, and career choices. 77/

These somewhat bland statements reflect the difficulties faced by data-gathering agencies in balancing the need to economize and avoid overlap, on the one hand, with the difficulties of responding to the needs of different users. As things stand, each statistics program presents problems in utilization.

CLASSIFICATION SYSTEMS

Among the factors that make it difficult to match information on the supply of and demand for labor is the existence of different classification systems. Federal agencies are attempting to deal with this problem in two ways - one, by providing the means of cross-reference different systems, and the other, by creating new, multipurpose classification systems. The subject of classification is not so much complex as it is fragmented. That is to say, the problem facing the user is not arcane theory; rather, it is the necessity to control an enormous amount of detail. The descriptions presented below are simplified and general; the reader who wishes more detail is referred to the reference sources.

At this writing in 1979, there are five major systems:

1. U. S. Bureau of the Census. The census aggregates all occupations into some 440 categories. 78/ The present study uses this classification. Although the categories devised for the 1970 census represented an improvement over the former scheme, many groups remained heterogeneous with respect to both occupational function and skill level. The detailed annotations in the Appendix deal with this problem insofar as it affects typical sources of training.

2. Standard Industrial Classification (SIC). 79/ While the Census has its own industrial classification, the SIC (as periodically revised) is in more common use. Its classifications and subclassifications can be aggregated into census groups for analytic purposes.

77/ Statistical Reporter, op. cit., p. 231.

78/ See, for example, U.S. Bureau of the Census, Census of Population: 1970, Occupational Characteristics. Final Report PC(2)-7A. Washington: Government Printing Office, 1973. The assignment to these categories is based on a census manual, Alphabetical Index of Industries and Occupations. Washington: Government Printing Office, 1971.

79/ Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual, 1972. Washington: Government Printing Office, 1972.

3. Dictionary of Occupational Titles, 4th edition. 80/ The DOT has long been the standard reference used by state Employment Service offices for placement purposes. It lists some 20,000 titles with job descriptions. Each title has a unique nine-digit code - the first three digits are related to job functions; the second three, to the relationship of the worker to data, people and things in the performance of the job. The last three digits constitute a suffix that distinguishes among similar jobs. Thus, 600.280-010 is the code for an instrument maker. The first digit, 6, is used for all machine trades occupations; 60 includes only metal-machining occupations; 600 is confined to machinists and related occupations. In the next three digits, we see the level at which instrument-makers and other machinists relate to data, (2 = analyzing) people (8 = taking instructions, or helping), and things (0 = setting up). It should be noted that in the three scales employed, 0 is the highest or most complex level of relationship, while 6 to 8 (depending on the scale) is the lowest or most simple. The last three digits simply distinguish instrument-makers from 11 other specific machinist titles.

An appendix lists all occupations by DOT-specific industry groupings. In addition, for each six-digit code, the DOT provides scaled information on a number of required worker traits and working conditions. 81/

4. Standard Occupational Classification (SOC). 82/ The first publication of a Standard Occupational Classification appeared in 1977. The classification was more than 10 years in the making and is intended to supplant not only census categories, but also all other classification schemes used in federal data-gathering.

The SOC is structured on a four-level system: division, major group, minor group, and unit group, with each level representing successively finer detail. Each group includes a listing of DOT titles from the 4th edition. Each DOT title is assigned only once so that cross-referencing and aggregation are simplified. Interestingly enough, however, for a system that is designed for multi-purpose use, the industry designation code for each title comes not from the SIC, but from the DOT.

The classification has the obvious benefit of being tied to a standard set of occupational definitions. From the point of view of training, however, it may make the attempt to create occupational information systems more difficult. Skill level, training, education, licensing and credential requirements usually associated with job performance are said to have been considered only when "an inaccurate

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80/ U.S. Department of Labor, Dictionary of Occupational Titles, 4th edition. Washington: Government Printing Office, 1977.

81/ These worker traits characteristics for the 4th edition will be published in 1979.

82/ U.S. Department of Commerce, Office of Federal Statistical Policy and Standards, Standard Occupational Classification Manual, 1977. Washington, Government Printing Office, 1977.

picture of the occupational structure would be presented without such consideration." 83/ While there is no doubt that these structuring variables went into the decision to add or delete a specific title, information on these variables is not included in the manual, and the classifications, as they stand, reflect similarity of work performed.

Thus, the unit groups often represent a mix of skill levels and training sources. The problem of skill level in the abstract is solvable because each DOT number in the various SOC classifications has associated with it a level of General Educational Development (GED, rated on a scale from 1 to 6) and a level of specific Vocational Preparation (SVP, rated on a scale from 1 to 9). But these designations have no bearing on the source of the occupational training that characterizes different jobs or groups of jobs.

5. Office of Education. The U.S. Office of Education has two major coding systems for identification of courses of training, one for vocational education and the other for higher education (HEGIS). These are distinct from all other schemes, and although efforts at cross-referencing have been made, the fit between these codes, on the one hand, and the census/BLS matrix categories and the Dictionary of Occupational Titles, on the other hand, is exceedingly limited. 84/

This brief outline by no means exhausts the classification differences among important data sets. For example, the Bureau of Labor Statistics itself uses different sets of definitions for occupations surveyed in the Occupational Employment Survey (see below) and in the Industry Wage Survey series. Furthermore, other federal agencies that collect and disseminate occupational data use still other systems. Among these agencies are the Interstate Commerce Commission, the Federal Communications Commission, the Federal Aviation Administration and the U.S. Civil Service Commission. 85/

The existence of different classification systems has inevitably led to attempts at cross-referencing so that data available from one source can be estimated in the units of another system. In this study, for example, we used a version of the census/DOT cross-reference tape originally created by coding of a 1971 Current Population Survey. 86/

83/ Ibid., p. 7.

84/ For a discussion of the procedures and limitations as well as actual conversion tables for vocational education alone, see U.S. Bureau of Labor Statistics, Matching Occupational Classifications to Vocational Education Program Codes. Tomorrow's Manpower Needs, Supplement 3 (Revised). Washington: Government Printing Office, 1975.

85/ For a full listing of data sources on the supply side, see Dixie Sommers, Occupational Supply: Concepts and Sources of Data for Manpower Analysis. U.S. Department of Labor, Bulletin 1816. Washington: Government Printing Office, 1974.

86/ Temme, op. cit.

Cross-referencing is often directed to improving the match between data on demand with data on the supply of workers with specific skills. The most ambitious scheme is the conversion system published by the California Employment Development Department, a scheme that cross-references census categories, DOT titles and Office of Education program codes. The link between a DOT title, which represents a job description, and a course of instruction does not mean that the training method is optimal or even acceptable for entry into the particular occupation. 87/ Workers acquire skills in many ways, of which formal schooling represents only one, and it is this problem that complicates the use of standard data in decision-making.

STATISTICAL PROGRAMS

The problem of multiple sources of training for different occupations, and sometimes for the same occupation, is well understood by specialists in the field 88/ but it is a problem that is not easily resolved in quantitative terms. The major statistical programs that address the issue emanate from the Bureau of Labor Statistics--on the (current) demand side, the Occupational Employment Statistics Program, and on the supply side, the various products of the Occupational Outlook Division.

Occupational Employment Statistics. This program, established by BLS in cooperation with the Employment and Training Administration and the individual State employment security agencies, has three elements:

a) The National/State Industry Occupation Matrix System provides employment data to show the distribution of occupations among industries for a base-line year. Change factors are then computed from the national base to produce target-year projects in matrix form for 241 occupations, cross-classified by 201 industrial sectors. 89/

b) The State and Area Occupational Projections Program assists state agencies in projecting occupational demand for states and for Standard Metropolitan Statistical Areas of 50,000 or more population. This procedure is carried out under the assumption that the change

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87/ Andrew M. Sum, Pawan K. Sawhney, Irwin L. Herrnstadt, Issues in the Development of a Comprehensive Occupational Information System for the Commonwealth of Massachusetts. Boston: DES Labor Supply Project. Department of Economics, Northeast University, 1977, p. 30.

88/ U.S. Department of Labor, Occupational Supply, Bulletin 1816, op. cit. and Sum, et al., op. cit.

89/ For a critique of the methods used in the I-O Matrix system, see Susan Hudson-Wilson and David Wheeler, State Employment Forecasting: An Evaluation of the BLS System. Draft Report Submitted to the Executive Council of the New England Regional Commission. Boston: Boston University Regional Institute in Employment Policy, 1977.

factors computed from national data are applicable to smaller geographic areas. The limitations of this approach has led the Bureau of Labor Statistics to begin improving the data base by incorporating the results of the OES field surveys described below.

c) The Occupational Employment Statistics Survey collects data on a three-year cycle from nonfarm establishments in various industrial sectors. In 1978, the survey was operational in 40 states and the District of Columbia. The data are collected for states and a limited number of sub-state areas. The survey is designed around the staffing patterns of two- and three-digit SIC industries; data are reported on 2,000 to 2,500 different occupations, defined by combining census categories with titles from the Dictionary of Occupational Titles (DOT). Respondents are provided with definitions for each occupation relevant to their industry.

Occupational Outlook Program. The best-known product of BLS in this field is the Occupational Outlook Handbook, published biennially and supplemented by the Occupational Outlook Quarterly. 90/ Although it is not clear how much vocational guidance actually takes place in secondary schools, 91/ the Handbook is the standard resource available to counselors.

The Handbook describes, for about 850 occupations arranged in 13 occupational clusters of related jobs, what workers do on the job, the training and education required, advancement possibilities, employment outlook and earnings, and working conditions. The occupations included account for "about 95 percent of all salesworkers; about 90 percent of professional, craft and service workers; 80 percent of clerical workers; 50 percent of all operatives; and smaller proportions of managerial workers and laborers. 92/ There are also 35 "industry statements" that duplicate some of the information in previous sections.

The Handbook identifies the possible training routes for occupations, including vocational education (public and private, secondary and postsecondary) apprenticeship, formal in-plant training, on-the-job tranning and, related to the last, essential experience in other jobs which provides steps up the career ladder.

A difficulty in using the Handbook is that it lists all of the ways in which training can be acquired in an even-handed manner so that it is impossible for users to judge which training route is more desirable and, in some cases, which may be altogether unacceptable

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90/ The latest edition of the Occupational Outlook Handbook is for 1976-77: U.S. Bureau of Labor Statistics. Washington: Government Printing Office, 1976.

91/ For a critique, see Eli Ginzberg, Career Guidance. New York: McGraw-Hill, 1971, pp. 201-203 and 295-296.

92/ Occupational Outlook Handbook, op cit.

to major employers of certain types of labor. The perhaps unavoidable problem created is illustrated in the use of employment and earnings data from the Handbook in proprietary school advertisements. Prospective students take such representations to mean that jobs are available in the occupational area for which training is being offered. The Federal Trade Commission in its investigation of this issue concluded that such general representations need not be banned but recommended that proprietary schools be required to supply supplementary information about the school's own record in placing graduates. 93/

The primacy of the Handbook as a counselling tool has been further solidified by the initiation of two federally funded career guidance systems in 1974, both of which incorporated the Handbook intact into their information banks. Approximately 27 CBEOCs (Computer Based Educational Opportunity Centers) have been established by the U.S. Office of Education. The mandate of the CBEOC system is to provide a free source of information about postsecondary education programs to low-income persons and specific target populations such as school dropouts, ex-offenders, and ex-addicts.

Each Center has a computerized library consisting of several data banks. In New York City and Dallas, where the centers operate on a fully computerized basis, clients may use mobile, user-operable terminals to draw information from the following data banks:

1. A job description bank containing 400 job descriptions and related information on educational and other requirements, working conditions, salary range and employment outlook, taken in toto from the Occupational Outlook Handbook. Increasingly, these national data are being revised to reflect local conditions in wages and in the employment outlook.

2. An education bank containing information on public and private postsecondary institutions, courses offered, educational requirements, and special programs.

3. An agency bank with information unique to the individual institution.

4. A financial aid bank providing descriptions of financial aid programs.

5. A financial aid "matching" bank which permits matching of the specific needs and characteristics of the client with the aid programs. Additional data banks with information on day-care centers and other supportive services are in process of installation.

Information is lacking as yet either on follow-through on the part of the clients or placement after training.

93/ Bureau of Consumer Protection, Federal Trade Commission, op. cit., pp. 59, 78.

The second of the two systems is sponsored by the Division of Career Information Services (DCIS, formerly the National Occupational Information System) under Department of Labor auspices in eight states to date. Aside from being administered on a state-wide basis (CBEOC is largely city-oriented), the DCIS is operationally identical to the CBEOC system. The reasons for initiating and maintaining two such closely parallel information systems are not altogether clear.

The Occupational Outlook Division of BLS has a broader interest in supply-side data than is reflected in the Handbook. A comprehensive review of data sources and issues, published in 1974, reviews the major information sources, provides an extensive bibliography, and most important for our purposes, discusses the problems in gathering systematic information on occupational supply. 94/ Specifying a "structural supply model"

> . . .requires a thorough examination of the occupation's skill content, traditional training and hiring requirements, institutional characteristics such as unionism and licensure, personal characteristics of the workers, and a variety of other qualitative and quantitative factors. 95/

Among other problems, it is hard to specify a source of supply if the skills required are minimal, if the skill content is not well defined or if the number of sources of training is large. Furthermore, occupational transfer patterns are hard to establish. We might add that internal labor market structures vary by sources of training--managers, for example, may be newly graduated MBA's, but they may also have gained their positions through occupational upgrading or transfer.

To build a model requires specifying the geographic area, a task complicated by the difference in scope of the market for various occupations, as well as by the data constraints imposed by political boundaries. Defining the occupation is an important issue to which we have already referred. The question of time also enters the process. Ideally, projections of supply are the most useful kind of data, but their production requires a time series to observe trends in supply, flows of workers, and response to changes in wage rates. 96/

From time to time, the Occupational Outlook Division has drawn together the national projections data and available supply information for several hundred occupations. This publication is the most comprehensive single source of information on sources of training. In its latest version, 97/ it brings together 1974 employment levels, 1985 projections of demand and annual openings due to growth and replacement needs, for 241 occupations that represent about two-thirds

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94/ U.S. Department of Labor, Occupational Supply, op. cit.
95/ Ibid., p. 5.
96/ Ibid., Chapters 1 and 2.
97/ U.S. Bureau of Labor Statistics, Occupational Projections and Training Data, Bulletin 1918. Washington: Government Printing Office, 1976.

of all jobs. It also supplies a cross-reference table that links census/BLS matrix categories to Office of Education codes. For a number of occupations, the information can be used to make inferences about preferred training routes. For example, estimates are supplied for certain craft occupations on the relative importance of apprenticeship for the supply of entry workers.

Although due recognition is given to the problem of local applicability, the work of the Occupational Outlook Division is national in scope. For selected regions and large cities, an important supplementary source of information is the Industry Wage Survey, a BLS series in which each bulletin covers a two-to-four digit industry. Bulletins are issued at irregular intervals, and important industries in both manufacturing and nonmanufacturing are resurveyed from time to time. Each bulletin describes the industry, estimates unionization, and gives a size-of-firm distribution, together with employment figures, wage rates and fringe benefits by occupation (excluding professionals and managers). These data are furnished for regions and cities where the particular industry employment is concentrated.

A useful feature of the survey is an appendix providing job descriptions for selected occupations. In combination with relative wage rates, these provide a rough approximation of skill level. The highest-skilled occupations can be identified by the following standard sentence in the job description, "In general, the work of a ___ requires rounded training and experience usually acquired through a formal apprenticeship or equivalent training and experience."

While survey coverage of industries, occupations and localities is not complete, those that are included provide local planners with important insights on the occupational structure of key industries in their areas.

SUMMARY

In the preceding pages, we have described some major classification systems and data sources bearing both on the demand and the supply sides of the labor market equation. The list of the elements that contribute to the demand for workers with specific occupationally-related skills is straightforward: demand arises from new openings created by economic growth and changes in technology and by replacement needs for workers who die, retire or leave the labor force for other reasons, transfer from one occupation to another, or who, on a local basis, migrate from one geographical area to another. To make reliable projections, however, requires assumptions that are inherently subject to error in a dynamic society. Total demand varies with both domestic and foreign events that cannot easily be foretold; and the components of demand vary even more, especially on a local basis.

Meanwhile, the technology of making projections has continued to advance. The quality of the baseline data has also improved, as evidenced by the greater specificity and timeliness of the Occupational

Employment Statistics Program. The employer surveys in that program furnish the best information yet available on a reasonably current basis. The projections available from the Occupation/Industry Matrix portion of the program, however, suffer from the usual limitations imposed by unforeseen conditions that affect demand and from the difficulty of translating the results for appropriate labor market areas.

If the demand side is complicated, the supply side poses qualitatively more difficult problems. For our purposes, the issue can best be stated in terms of overlapping sources of training. It is possible to think of the following types of supply overlap:

1. Training that qualifies for more than one occupation.

2. Occupations that are drawn from several types of background training.

3. Occupations that are drawn from mixed types of training.

4. Occupations that are part of promotional ladders and are thereby one or more steps removed from background training by experience in other occupations.

The absence of a clear relationship between type of training and subsequent occupational status, especially for many kinds of employment in the middle ranges of the occupational structure, makes it exceedingly difficult to estimate supply and even more difficult to project it.

The best-informed attempts to match projected demand and supply inevitably fall short. On the local level, planners responsible for making decisions on training programs and information specialists responsible for providing relevant information for vocational guidance have found it difficult to use the available data for their purposes. In the next chapter, we will review some of the ways in which their dilemmas have been addressed and propose some simplifications in the presently mandated processes.

6. USING THE DATA

In spite of the heroic efforts of both national and state agencies to meet the demand for usable data, planners at the local level have generally made only *pro forma* use of available statistics in the planning process. Whether or not more rational use of data is impossible, as one critic suggests, 98/ the difficulties are certainly great, and they stem from two quite different causes. One is the seeming intractability of the data themselves, in terms of format, reliability and timeliness. Just as important in some cases are the constraints of the organizational structures in which planners work.

These problems are spelled out in some detail in a survey of the uses of manpower data in vocational education. 99/ The authors imply the relative unimportance of planning by describing it politely as "a support function" and by the statement that "the state plan for vocational education is not regarded as a viable management document in many states."100/ At both the state and local levels, published data on demand are unknown, mistrusted or considered too technical to be useful. Although states encourage local assessments of manpower needs, none requires local agencies to use specific data sources. And, in fact, at the local level, where the decisions are made, the greatest reliance is placed on information from advisory councils and local surveys.

On the institutional side, it is clear that local school systems with sunk costs in plant and equipment and with tenured teachers cannot quickly change their course offerings even if the data on which they relied provided perfect forecasts. In effect, as Stevens argues, the reason for their "perfunctory cooperation" lies in the absence of incentives:

> Professional educators and associated staffs and physical plants are already arrayed across the country. Any inconsistency between employment projections and the range of preferred capabilities of these resources will evoke adoption of a defensive self-serving posture, just as it would in any other part of the public or private sectors. 101/

98/ David W. Stevens, Employment Projections for Planning Vocational-Technical Education Curricula: Mission Impossible? Columbia, Missouri: University of Missouri, Human Resources Research Program, January 1976.

99/ Ten states, one in each federally designated region, were analyzed in depth. Drewes and Katz, op. cit.

100/ Ibid., pp. 7, 12.

101/ Stevens, op. cit., p. 37, emphasis in the original.

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CETA planners, with less infrastructure at stake, would seem to be freer and to possess more flexibility in designing training programs, but they too have problems with using employment projections, problems that are exacerbated by the limited scope of the training they may offer. To pick one's way through estimates of future demand, types of occupations that warrant training but are not too highly skilled for the target population, the limitations of resources, and the recognition of alternate sources of supply, is surely a complex task.

It is not surprising, therefore, that both vocational educators and CETA personnel tend to rely on locally-generated information rather than on centrally-generated data. In fact, a contribution to better decision-making may well be better local information-gathering techniques and above all, better guides for interpreting the local scene. Information is not a thing in itself. As the following examples indicate, users must bring some sophistication to bear on interpretation.

In 1966, the Bronx Community College of New York City decided that careers would be plentiful in plastics technology. Acting on a belief that had been encouraged by advice from the industry and from professional organizations, the College remodeled a large facility to house a special Division of Plastics Technology. By 1974, the program, which had never had a sizeable enrollment, was totally without students. It is probable that this expensive failure was due to a serious misunderstanding of the field. The required chemists come from university departments of chemistry or chemical engineering, not from two-year programs. In the fabrication of plastic articles, which constitutes most of the industry in New York City, shops are small and the number of skilled personnel required is even smaller. Most workers require few skills, and the industry pays relatively low wages.

On the other hand, Philadelphia CETA found in its search for local information that shoe repair shops needed trainees. This trade is generally held in low regard, but with price inflation, the demand for services is high, and the supply of immigrant shopkeepers is low. A modest program to place CETA enrollees in on-the-job training seems likely to succeed in preparing at least a small number of new workers for an occupation in demand. The point here is that the necessary information could only be generated locally.

It is not always easy to trace the reasoning behind decisions to offer training in new fields or even to continue programs. But one thing that most training institutions have in common is that they do not take into account alternate sources of supply - through immigration, mobility, reentry, and particularly from other institutional forms such as proprietary schools and industry itself. In a word, most planners in the public sector acknowledge their competition in the most cursory fashion.

Attempts to overcome parochalism have only begun to focus on this

aspect of the planning problem. The cooperation between CETA and "local education agencies" under the Youth Employment legislation is breaking down barriers at the local level. On the analytic side, the National Occupational Information Coordinating Committee (NOICC) and its state counterparts, which were mandated by the 1976 Educational Amendments, have the greatest potential for contributing to the planning process in the future. In its first two years, the effort of these bodies has focused on the creation of Career Information Systems, two of which (CBEOC and DCIS) were discussed in the previous chapter. Meanwhile, grants have been made to align some of the classification systems described in Chapter 5, particularly to transform the vocational education and HEGIS codes into SOC categories. On the planning side, state OICC organizations are attempting to align supply and demand data, relying in the main on the California "crosswalk" referred to in Chapter 5.

Writing requirements for coordination and mutual program review into the law demonstrates a clear Congressional intent to further the integration of training programs in the public sector. The issues in achieving this goal have generated a number of studies at ever increasing levels of sophistication. 102/ The most comprehensive recommendations emerge from the work of Andrew Sum and his colleagues in Massachusetts. 103/ Our own efforts, directed at a relatively narrow field, are probably best understood in the context of the kind of total information system produced in this work.

The Massachusetts study deals with the full range of issues on the demand and supply sides of the labor market as they affect training decisions. On the demand side, there is a call to disaggregate the data produced by the Occupational Employment Statistics program to substate levels. The projections should be improved, first, by reviewing the techniques currently in use and by considering more sophisticated models; 104/ second, by the introduction of alternative sets of assumptions; and third, by introducing the OES survey data into the occupation/industry matrix now used as the base for making projections.

On the supply side, as we have already indicated, the issues are more complex, in part because the market intervenes in the matching

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102/ See, for example, Robert C. Young, William V. Clive, Benton E. Miles, Vocational Education Planning: Manpower, Priorities, and Dollars. Center for Vocational and Technical Education, Ohio State University, R & D Series No. 68. Washington: Government Printing Office, 1972; Roger H. Bezdek, Long-Range Forecasting of Manpower Requirements: Theory and Applications. IEEE Manpower Monograph. New York: The Manpower Planning Committee, 1974; Drewes and Katz, op. cit.; Stevens, op. cit.; Jim W. Atteberry, Wilbur R. Miller, James A. Pershing, Improving Vocational Education Planning: More Myth than Reality? Columbia, Missouri: Department of Practical Arts and Vocational-Technical Education, University of Missouri, 1977.

103/ Sum et al., op. cit.

104/ For example, the model for the State of Maine developed by Susan Hudson-Wilson and David Wheeler, op. cit.

process. To economists, supply is not a single number but a function of the relationship of all potential workers in an occupation and the wage rates at which they are willing to work. From an institutional point of view, the most important problem is one to which we have already referred several times--the variety of sources that produce candidates for job openings in different fields. Estimating the number of these "availables" by counting the "output" of employment-related educational and training programs is the first step. It is complicated not only by classification and cross-referencing problems, but also by the need for supplementary information on labor-market linkages, since relating a vocational program to an occupational category does not necessarily imply that the program is the optimal or even typical method of skill acquisition for the occupation in question.

Sum and his colleagues explore the cross-referencing question in great detail. The existing imperfections in the matching process have led them to work on the design of allocation rules for distributing cases that cannot be matched on an obvious one-to-one basis. 105/ They believe that implementation of the Standard Occupational Classification system will assist in the matching process, 106/ but it remains to be seen whether the advantages of being able to match discrete occupations will be outweighed by the problems of heterogeneity created at the various levels of aggregation in the SOC.

Other problems in demand-supply matching are, first, the choice of the appropriate geographical base; second, the level of occupational detail (again, a classification problem); and third, the identification of the responsive adaptations made by employers to changes in the skill mix of the labor force. 107/

Given the difficulties of labor supply analysis, the study recommends that State Occupational Information Coordinating Committees limit the focus to a subset of occupations "characterized or believed to be characterized by low, short-term elasticities of supply." 108/ In other words, occupations requiring relatively long lead times to produce trained workers deserve more attention because training decisions that result in oversupplying or undersupplying the market can be quite costly.

105/ For an example of the problem, the census group "Electrical and Electronic Technicians" is related to six different Office of Education codes, which in turn provide training potentially related to 20 census occupations. Sum, et al., op. cit., p. 33.

106/ Ibid., p. 70.
107/ Ibid., pp. 35-37.
108/ Ibid., p. 20.

On the other hand, it is not worthwile to gather information or data on occupations with low educational and skill requirements. Dixie Sommers has made a series of related points in suggesting that supply information be limited to a set of carefully chosen occupations. These occupations, which are in one way or another important to the health of the economy or the society, are likely to be either, a) those that employ large numbers of workers; b) those that deliver crucial services; or c) those that are expected to experience drastic increases or decreases. 109/

The Massachusetts study includes the results of the Northeastern University Labor Supply Project. Boston employers were surveyed on their hiring requirements and practices with respect to 26 occupations. The occupations were chosen for study if they were characterized by favorable projected numbers of job openings and if training could potentially be provided by vocational education or CETA programs. Among other things, the results showed that most new hires had higher educational achievements than the minimum required according to the employers' own statements, a fact that reflects both the looseness of the labor market and the rise in general educational achievements in the population. 110/ For our purposes, however, the findings are most illuminating for the light they shed on variations in sources of supply. 111/

The information presented in our study stands in some contrast to Sum's efforts to refine the data base. First, it is limited to supply-side problems. Second, it utilizes a methodology, best described as a series of successive delimitations, which, while relatively crude, can serve to increase the sophistication of planners, particularly those in CETA activities, who must cope with complex data and an imperfectly understood local institutional scene. The preceding chapters are an attempt to simplify the overall setting; the appendix furnishes detail on a clustering scheme designed as a first step in approaching the problem of identifying competitors in the business of training for different occupations.

We are not here concerned in detail with the problems of demand-side data. In the accompanying materials on New York City (Chapter 7), however, we have attempted to use the Occupational Employment Statistics Survey, supplemented by other local sources, as a way of identifying important occupations and industries. In this context, importance is largely judged by magnitude. Whether the occupation in question is expected to increase or decrease (leaving aside the methodology for making the determination), large-scale sectors must be taken into account. Where

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109/ Dixie Sommers, "Occupational Supply Information and Planning for Education and Training," Paper presented at the North American Conference on Labor Statistics, Ottawa, Canada, July 26, 1976, p. 12.

110/ Sum, et al., op. cit., pp. 44, 52.

111/ Where appropriate, the findings are incorporated in the annotations on sources of supply that appear in Appendix D of our study.

employment is large, replacement needs alone may account for more demand than where employment is small but growing.

On the other hand, scale alone is not enough to warrant training decisions. In times of severe cutbacks, for example, even the large health sector may experience long lags in reabsorbing laid-off workers. Furthermore, no planner wants to miss opportunities just because the number of trainees who might be placed is small.

But quite apart from the numbers that are involved, training decisions should be informed by prior conceptions of the institutional constraints that surround the acceptability of the training to be offered. There is a difference between counting "availables" and attempting to match them with projected openings, on the one hand, and pursuing, as we are attempting to do here, the recognition of certain institutional regularities. As Sum has pointed out, the existence of a training program does not confer legitimacy. The output of a course of study can be counted, but even if the training is somehow logically related to an occupation, there is no guarantee that the graduates are acceptable to employers in the field. Where constraints, traditions or preferences interfere, those who might seem to be "availables" are no better off in the labor market than a random sample of others.

Certain of these regularities in sources of training seem to be national. Thus, with limited exceptions, computer programmers are recruited from the junior and senior colleges; they typically have had some exposure to the field and receive additional training on the job in large organizations. In other occupations, constraints are purely local and sometimes idiosyncratic. Thus, a New York City proprietary school for training gambling casino workers will fail to place its graduates in Atlantic City because the state of New Jersey has decided that casino workers must not only be New Jersey residents but must also complete a training course offered in the state and approved by the state.

As we have indicated in earlier chapters, the dialogue with employers on questions of training is particularly difficult. As a rule-of-thumb for making decisions that involve firms, Sum recommends the following:

> Those occupational programs should be expanded that prepare participants for jobs in which the provision of on-the-job training would impose substantial costs upon the firm. If this institutional program were not administered, the firm either would not provide any on-the-job training to workers in this occupation or would provide such training to fewer participants than those actually trained by the institutional program. On the other hand, if the firms typically provide on-the-job training to new employees, if this training is intimately tied into the production process, and if the schools either cannot expect to duplicate the equipment found in the work place or can duplicate it only at great expense, then expansion of specific institutional training in such occupational areas is not warranted. 112/

112/ Sum et al., op. cit., p. 38.

The negative imperatives in this recommendation are more persuasive than the positive ones. Surely, an institution should not be in the position of competing with an employer who will not accept outside training. But the suggested indicators for positive action are not subject to the same degree of certainty. Consider that many firms do not or cannot ascertain the costs of training; their decisions, as we pointed out earlier, tend to be on the grounds of unique needs.

Even where it seems eminently reasonable to undertake training, other factors may undermine rational decision-making. An example of intractability emerges from a study by the Connecticut Business and Industry Association, which focused on metalworking. The problem is cast in terms of the study report title, "Unfilled Jobs in the Midst of High Unemployment." 113/ What emerges is a picture of an aging workforce in the highly skilled metalworking trades and a paucity of training programs to replace them. In effect, the Association recommends a change in focus of CETA because "most of the long-term unemployed and disadvantaged eligible for CETA funds lack the basic educational skills necessary to succeed in the classroom training part of skilled machine trade jobs." Specifically, the Association wants CETA funds for upgrading "present entry-level industrial workers," as well as a shift in priorities from public service employment to skill training and basic education. 114/

There is in all this no suggestion that "present entry-level" workers, that is, workers with standard qualifications, are lacking. The question becomes, "Why are employers not routinely upgrading workers in an industry typically characterized by on-the-job training?" Actually, the problem is chronic. The industry in Connecticut consists of a few very large firms and a number of smaller job shops operating in an exceedingly volatile product market. The large firms have characteristically done the training, while the entrepreneur-tradesmen of small firms feel themselves unable to take time out for training activities. When demand goes up abruptly, the competition for skilled workers is acute and training is naturally neglected. When demand falls abruptly, no one is interested in adding to the pool of laid-off workers. It is hard to see how CETA can intervene in this situation unless a relatively long-range plan can be developed that would move CETA clients gradually to the point of entry, and subsequently to a kind of "sandwich" program of alternate periods on and off the job. Better still would be a program along the lines of TAT in Oak Ridge where a large firm would undertake (at whatever level of subsidy necessary) the operation of a centralized, one-the-job program at several skill levels that would provide workers for the industry on a regional basis.

113/ Loc. cit. Hartford: Connecticut Business and Industry Association, 1977.

114/ Jean Parker, letter to Eli Ginzberg, February 15, 1978.

SUMMARY

As the amount of data increases and as models become more sophisticated, an important lesson for planners is to avoid slavishness in applying new sources of information to decisions about training programs. Cross-sectional occupational data disaggregated by industry are a useful guide to the structure of local labor markets; any job title with a high frequency is likely to remain an important source of employment for some time to come.

While all large categories should be taken into account, small ones should not be ignored. There are often opportunities to arrange for small numbers of workers to be trained in desirable occupations. But this is precisely the kind of information that gross data do not uncover. Rather, it is local knowledge and the functioning of an informal network that is crucial.

In general, it is best to treat precise occupational projections with some wariness. The number of job openings is a function of both secular and cyclical trends, as well as the cumulative effects of technological change and the consequences of corporate mergers and plant relocations. The directors of CETA programs in large cities have already discovered the importance of working with local economic development authorities who, in their efforts to attract business, usually have control of detailed information on the short-run demand for labor.

On the supply side, the problems are somewhat more complicated. First, it is important to know which jobs at all levels of the occupational structure require pre-employment occupational training and which do not. Second, one must distinguish, on the one hand, those jobs requiring entry workers with minimal literacy requirements and acceptable personal qualifications, and on the other hand, those at higher skill levels for which occupational training is carried on entirely in the workplace. In the case of the former, it is all but impossible to justify investments in training; in the case of the latter, training outside the firm should only be undertaken with a firm commitment from potential employers that they are, indeed, willing to give up control of some part of the necessary training.

There are no hard and fast rules to be invoked in dealing with employers because their decisions on training are seldom based on general principles. At one end of the spectrum, the utilities, with their fixed capital and their need to provide continuous service, are the obvious prototypes for elaborate in-house training systems. At the other end are the small proprietors who deny that they have either the time or the resources to devote to training, especially if skill must be acquired over a long period of time.

In between are a great many managers whose aim is to minimize in-house training. Naturally, every employer would like to find ready-made workers who would fit into the firm's scheme of things with a minimum break-in period. That is only another way of saying that employers wish whenever possible to shift the costs of training to the

worker or to the public sector, or both. But there are other things employers wish to avoid besides costs--the diversion of scarce resources for supervision; the perceived difficulty of orienting young workers, particularly if they are from minority groups; the nuisance factor of having green hands underfoot. While it is true that all of these negative features can be considered costs, it is interesting to note the reluctance of employers to accept monetary compensation in the form of subsidy or tax preference for training purposes.

In the end, there are limits to shifting the burden, and these limits can be discerned in an employer's estimate of which skills and workers are essential for operation and, among those, which must perforce be learned on the employer's premises. The felt needs of employers can best be deduced from what they do rather than what they say, including not only the training programs they offer, but the sources they use to recruit new workers. By "sources," we do not mean whether the hiring process involves direct application, placing a help-wanted ad, or using an employment agency. We mean the source of the worker's training (if any) for example, a vocational school, the armed forces, prior experience, etc. Among other things, the planner must know what the competition is--which existing programs are supplying workers and where a proposed new program will fit in. In a loose labor market, it is better to spend time on general preparation--improvement of basic skills--than it is to train narrowly for a specific slot in the occupational structure, unless a bargain has been struck to insure that the skills acquired can be sold to a specific employer.

In both public opinion generally and educational opinion specifically, there are regular swings that emphasize, now classroom training in occupationally-related skills (an important aspect of the "career education" movement), and now the virtues of on-the-job training, from apprenticeship to more widespread "private sector initiatives." Meanwhile, a good many institutional practices are in place. At a minimum, planners need to know the basic structure of their localities, how things are being done, and what the effects of the last "new" movement have been. In a complex, and often ungrateful atmosphere, well-meaning proposals easily go astray. Staying on the path requires information about the terrain.

In the next chapter, we present data for New York City to show how basic pieces of information may be put together to form a context for making decisions about training.

PART II

7. APPLYING THE LOGIC: THE CASE OF NEW YORK CITY

REPRISE

Official policy, as expressed in the Manpower Development and Training Act of 1962, the Comprehensive Employment and Training Act of 1973, the Educational Amendments of 1976, and the Youth Employment and Demonstration Project Act, has given training a key role in creating a bridge to work for the unemployed, the underemployed and those considered economically and socially disadvantaged. The national record of training programs is mixed, and New York City efforts, perhaps because of their scale and complexity, have inspired frequent investigations.

In evaluating training programs, the focus is often on outcomes and sometimes on benefit/cost ratios. But there are prior questions that can and should be raised in the planning and implementation stages. Among these are:

- which entry-level jobs require training (over and above general orientation) either before or after employment?

- what skill levels are required for the proper performance of these jobs?

- for the occupations identified, what are the usual paths to the acquisition of training and relatedly, which are, from the employer's point of view, the approved training methods and training facilities?

An approach to deriving answers to these questions has been outlined in the previous chapters. Ten major occupational clusters were established on the basis of two criteria:

1. Occupational Skill Level--defined in terms of mean level of specific vocational preparation (SVP) acquired through: vocational education; apprenticeship training; in-plant or on-the-job training; experience gained in other jobs.

2. Paths to Training--with training defined as job-specific skill acquisition rather than either general literacy or socialization. Training is classified as either formal or informal in type and pre- or post-employment in locus.

> Pre-employment training: Informal pre-employment training may be said to occur in the acquisition of widely-held or life-experience skills such as driving or child and household care. Since jobs requiring such skills generally are assigned SVP levels of less than 3, they were excluded from detailed analysis. Formal types of pre-employment training are usually acquired for the middle skill-level occupations through vocational training, either public or private. It may be

orientational in type, helping the applicant survive the screening process, as in the case of the junior college graduate who has majored in finance and is hired as a bank trainee, or the high school student who has taken the shop courses for machinists, or it may involve more specific and standardized preparation for direct entry, as in the case of typists or the growing number of occupations subject to licensing requirements.

Post-employment training: This type of training translates into the proposition that getting the job is the way to get the training. This may consist of either formal in-house or off-site training or of informal or formal (e.g., apprenticeship) on-the-job training, or some combination of these. The use of formal training has no necessary relation to skill level--relatively low-skill fork-lift operators receive formal training while high-skill instrument makers may be the product of informal if lengthy on-the-job training.

In recent years, such factors as the increased availability of federal training monies and of direct student tuition assistance grants; the expansion of the junior college system and the increased popularity of vocational education; and the extension of licensing and credentialling into new occupational areas have led to an inflation in required training times, a shift in type of training from informal to formal (even where replication of the conditions of the workplace is extremely difficult) and in locus from post- to pre-employment training. These forces have been operative even in low-skill occupations with an SVP of 2 ("anything beyond short demonstration up to and including 30 days"): New York City proprietary schools offer courses to train messengers (six months), bank tellers (three weeks) and cash-register operators (two weeks).

Organization of the 1970 national employment figures in ten occupational clusters revealed that in spite of the trend toward formal training (which has accelerated in the past decade), the necessary training for roughly two-thirds of all jobs was received largely on the job (Table 1).

Pre- and post-employment training are not rigid classifications and in fact, varying combinations and degrees of cross-substitution exist among both types and sources of training. Machinists come out of both structured apprenticeship training and unstructured on-the-job training, allied health personnel out of hospital-based schools which provide brief classroom training, supplemented by extensive on-the-job training, or from junior colleges after lengthier formal training periods.

In spite of these caveats, use of this two-criteria occupational clusters model can provide a means by which to identify duplication and overlapping of training for the same occupation on the one hand and gaps in training on the other. In can also provide a rough fix on the position of an occupation in the map of the labor market according to the two coordinates, skill level and usual training paths. This map of the local labor market can, in turn, be derived either directly or indirectly by use of those parts of the Occupational Employment Statistics (OES) program available for the area.

THE OES PROGRAM AND THE INDUSTRY-OCCUPATION MATRIX

The OES program has three components. These are the National/State Industry/Occupation Matrix System, the State and Area Occupational Projections Program and the Occupational Employment Statistics Survey. 115/ The last is a mail survey conducted under a cooperative arrangement between the Employment and Training Administration of the U.S. Department of Labor and the State Employment Security agency.

The system of occupational classification used in the OES program has two sources: 1) The Census of Population classification is used for the six major categories: manager and officer; professional and technical; sales; clerical (office, plant); production, maintenance, construction, repair, material handling and power-plant occupations; service occupations. 2) For the several hundred detailed occupational titles within these categories, classification is based on the DOT and the advice of industry experts.

The industry-occupational matrix that emerges will, depending upon the characteristics of the local economy involved, locate several hundred occupations in several hundred industries, resulting in a matrix with a very large number of "cells" that yield information on the type and number of workers employed in each industry. These cells can be combined on a number of logical bases according to the requirements of the user.

New York is one of the states in which all three elements of the OES program described above are operative.

The sample is chosen from those nonagricultural and nonmining establishments covered by the New York State Unemployment Insurance Law. It is stratified by area (to date, this translates into New York City and Remainder of State); by industry, on a two-digit SIC basis, as defined in the SIC Manual, and where necessary to reduce the possibility

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115/ U.S. Bureau of Labor Statistics, Tomorrow's Manpower Needs, Vol. IV. Industry-Occupational Matrix, Bulletin 1737. Washington: Government Printing Office, 1971.

of industry misclassification, by three-digit SIC; and by employment size. While all establishments with 100 or more employees were covered in the sample, those with fewer employees were sampled according to a predetermined weighting pattern.

The time frame of the OES Survey is a three-period cycle with data for the major industry sectors collected at different "reference periods." For the manufacturing sector, the reference period was September 1974; for Federal government, October 1974 and for State and Local government, September 1975; for selected nonmanufacturing industries, April, May and June 1975, and, for selected transportation and communications, as well as for wholesale and retail trade, June 1976. The first cycle has been completed for New York and at this writing, publication of some second cycle results has begun.

Before analyzing the results of the New York OES Survey, it is important to establish what the data do, and perhaps more importantly, what they do not reveal. An industry-occupation matrix provides a cross-sectional view of an area's labor market and of the jobs filled by the employed labor force at a particular time. The level and structure of this actual employment is a product of the historical forces of both supply and demand, although actual or observed employment has become widely, if erroneously, accepted as an indicator of the demand side of the equation alone. This mistake probably stems from the fact that actual employment is used as a major baseline in the construction of occupational employment projections which are largely based on demand considerations without corresponding projections of supply.

It should also be realized that the OES occupational classess--managers and officers; professional and technical occupations; sales occupations; clerical occupations; production, maintenance, construction, repair, material handling and powerplant occupations; service occupations--provide no clues to skill levels or training paths except for what is implicit in two categories: professional and technical; and managers and officers. 116/ The gap was closed, however, by the application of the occupational cluster model described above (Table 1) to the matrix. This task involved reorganizing the occupations in the matrix according to the occupational clusters used in that model, so that they became simultaneously categorized by skill level and usual training path. The New York City industry-occupation matrix, expressed in absolute numbers is shown in Table 7.1, while the same information, expressed in relative terms, appears in Table 7.2. A technical note on the data source (OES) and its coverage appears at the end of this chapter.

116/ The second-cycle publication of the New York OES mail survey results in Manufacturing (April-June 1977) introduces a three-fold classification for production, maintenance, construction, repair, material handling and powerplant occupations: skilled, semiskilled and unskilled.

INDUSTRY GROUPS: 117/

A one-dimensional analysis of the industry groups and occpupational clusters which, taken together, constitute the matrix, is a useful preliminary to the examination of the matrix itself.

Analyses of the New York City economy usually focus on the altered position of the major industries which make up its economic base.

> At the turn of the twentieth century the foundations of the City's economy were its port and railroad linkages with the hinterland together with broad manufacturing activities reinforced by leadership in finance, commerce, the professions, culture and the arts. By mid-century, the port and the manufacturing sector had declined but large corporate headquarters and their support services had emerged as centers of growth to offset the decline. 118/

117/ The balance of this chapter should be read together with Appendix E.1-10.

118/ The Conservation of Human Resources Project, Columbia University, The Corporate Headquarters Complex in New York City. New York, December 1977, p. 1.

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These trends were not confined to New York and in fact, the situation in New York seemed to reflect that of the country at large:

> Given the tendency for manufacturing employment to decline in relative importance and for rather sharp increases to occur in shares of employment in service classifications, the marginal impact of services employment expansion has been dramatic. For the decade of the 60's, business services, consumer services and government accounted for 80.3 percent of all job increases in all SMSAs.
>
> The medical, educational, other professional services (largely in the private not-for-profit and public sectors) were the sources of the most dramatic gains during the 60's. 119/

An examination of Table 4 reveals how closely the New York City industry-employment pattern approximates this national description. Taken together, the goods-producing industries such as construction, manufacturing and utilities, provided about one-fifth of the city's jobs, with the largest manufacturing industries, apparel and textile mill products and printing and publishing, providing about one half of

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119/ Thomas Stanback, Jr. and Matthew Drennan, The Transformation of the Urban Economic Base. A Special Report of the National Commission for Manpower Policy, Special Report No. 19. Washington, February 1978, p. 34.

Table 4. New York City Industry-Occupation Matrix, 1974-1976

Industry Group (SIC No.)	Total Percent	Total	Pre-Employment Training Required: Professionals (1)	Pre-Employment Training Required: Tech., Cler. and Service (2)	Pre-Employment Training Not Required: High-Skill White Collar (3)	Pre-Employment Training Not Required: High-Skill Blue Collar (4)	Pre-Employment Training Not Required: Other Skilled & Semi-Skilled (5)	Low-Skill Occupations: Clerical & Sales (6)	Low-Skill Occupations: Blue Collar (7)	Low-Skill Occupations: Service (8)	Diverse Training Patterns: Managers & Administrators (9)	Diverse Training Patterns: Artists & Performers (10)
		2,970,309[a]	337,751	429,336	147,485	174,960	371,454	478,995	292,235	323,763	404,334	10,079
	100.0	100.0	11.4	14.5	5.0	5.9	12.6	16.2	9.9	11.0	13.2	0.3
Production Industries	21.6	639,066	26,773	53,707	17,069	82,073	143,488	49,299	155,832	6,850	101,755	1,480
A. Construction (15, 17)	2.3	69,140	1,950	5,080	440	31,100	9,710	2,830	9,070	480	9,070	--
B. Manufacturing	18.4	543,956	22,973	45,647	17,429	43,953	128,658	42,699	145,402	5,810	89,365	1,480
Nondurable	13.6	400,641	18,220	35,505	15,110	36,671	114,115	34,885	95,150	4,025	45,620	1,360
Food and kindred (20)	1.3	38,376	1,710	3,000	1,540	2,816	7,530	2,840	16,070	880	5,050	--
Apparel and Textile Mills (22, 23)	6.5	193,340	680	8,960	6,080	11,640	94,180	13,380	39,700	1,050	17,680	--
Printing and Publishing (27)	3.2	93,240	10,980	14,390	5,110	15,690	7,170	12,570	12,140	1,030	12,980	1,240
Paper (26)	0.6	18,620	760	1,360	620	4,550	820	1,510	6,960	210	1,930	--
Chemicals & Allied (28)	1.0	30,880	3,040	6,120	1,650	910	8,330	3,040	6,440	680	5,770	100
Miscellaneous (39)[b]	0.9	25,185	250	1,775	110	1,025	2,085	1,535	15,840	235	2,330	--
Durable	4.8	142,715	4,753	10,142	2,319	7,282	14,543	7,816	50,252	1,785	43,745	80
Fabricated Metals (34)	0.9	27,000	510	1,900	470	5,030	3,380	1,040	11,840	340	2,490	--
Machinery, Electrical (36)	1.2	34,910	3,760	4,010	590	1,520	2,290	3,130	13,180	590	5,770	80
Other Durable (24, 25, 32, 33, 37, 38, one-half of 39)	2.7	80,805	483	4,232	1,259	732	8,873	3,654	25,232	855	35,485	--
C. Utilities (49)	0.9	26,970	1,850	2,970	n.a.	7,020	5,130	4,370	1,360	560	3,380	--
Service Industries	78.4	2,331,223	310,978	375,629	129,556	92,887	227,966	429,696	136,403	316,913	302,579	8,599
A. Transportation (41, 42, 44, 45)	4.5	133,605	2,200	10,290	2,140	9,780	29,960	9,775	44,480	9,850	15,130	--
B. Communications (48)	2.1	62,790	3,010	6,570	1,380	2,460	18,140	17,060	160	900	12,910	--
Total Trade	17.6	520,729	9,450	57,175	72,072	27,803	54,671	146,373	52,712	7,787	[illegible]1,880	806
C. Trade, Wholesale (50, 51)	8.2	242,540	7,720	42,390	39,870	12,580	13,160	43,460	37,330	2,120	43,530	580
D. Trade, Retail	9.4	278,189	1,730	14,785	32,202	15,223	41,511	102,913	15,382	5,667	48,350	226
Durable (52, 551, 57)	1.5	43,750	110	1,900	13,000	3,250	6,810	6,500	2,470	520	9,190	--
Nondurable (56, 598)	1.7	48,690	320	2,670	3,970	2,500	7,210	20,070	2,710	1,860	8,140	40
Other Retail (53, 54, balance of 55)	6.3	185,750	1,300	10,216	15,232	9,473	27,491	76,343	10,402	4,087	31,020	186
E. FIRE (60-64)[c]	10.8	319,300	22,320	71,400	37,070	1,390	12,360	104,230	380	8,980	61,230	--
F. Producer & Legal Services	10.6	314,880	66,680	84,550	13,890	2,100	12,550	37,690	5,660	65,910	34,380	1,470
Business Services (73)	6.0	170,650	16,210	31,730	13,340	1,700	8,920	27,710	3,880	55,130	20,010	--
Legal Services (81)	1.8	54,000	27,000	27,000	--	--	--	--	--	--	--	--
Miscellaneous Business Services (47, 89)	2.8	[illegible]230	23,470	25,820	550	400	3,630	9,980	1,780	780	14,370	1,470
G. Restaurants, Hotels and Motels (58, 70)	4.6	135,340	580	1,270	60	16,410	730	5,380	550	97,720	12,640	--
H. Other Consumer Services (79)	0.8	22,630	170	2,585	--	1,110	640	3,630	690	5,385	2,900	5,940
I. Health Services (80, 806)	8.7	255,605	55,461	90,326	1,211	4,191	11,475	12,206	6,291	63,062	11,151	91
J. Education, Welfare and Nonprofit (82, 84, 86)	8.9	263,478	117,880	29,347	890	3,982	10,364	21,162	940	50,471	33,120	388
K. Public Administration[d]	10.3	302,666	33,227	25,716	643	24,101	77,074	75,151	25,140	16,940	27,650	30
Federal	3.2	93,426	8,577	9,656	273	2,031	11,124	45,451	4,530	3,798	7,950	30
Local	7.1	209,240	24,650	16,060	370	22,070	65,950	26,700	20,610	13,150	19,680	--

a) See Note on Coverage. b) 1/2 Allocated Equally between Durable and Non-durable Manufacturing. c) Real Estate not available. d) Excludes employment in educational facilities and hospitals.

Table 5. New York City Industry - Occupation Matrix, 1974-1976 [Percentage Distribution (- = less than 1%)]

Industry Group (SIC No.)	Pre-Employment Training Required		Pre-Employment Training Not Required			Low-Skill Occupations			Diverse Training Patterns	
	Professional (1)	Tech., Cler., Services (2)	High-Skill White-Collar (3)	High-Skill Blue-Collar (4)	Other Skilled & Semi-Skilled (5)	Clerical and Sales (6)	Blue-Collar (7)	Service (8)	Managers and Administrators (9)	Artists and Performers (10)
Total Column	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Row	100.0	11.4	14.5	5.0	5.9	12.6	18.2	9.9	11.0	13.2
Production Industries										
A. Construction (15,17)	100.0	4.2	8.4	2.8	12.8	22.5	7.7	24.4	1.1	15.9
B. Manufacturing, Total	100.0	* 2.8	7.4	-	45.0	14.0	3.2	13.1	-	13.1
Nondurable	100.0	4.2	8.4	8.1	23.7	29.8	7.9	20.8	1.0	16.5
Food (20)	100.0	4.6	8.9	3.8	9.2	20.5	8.7	23.8	1.0	11.4
Apparel and Textile (22, 23)	100.0	4.3	7.6	3.9	7.1	19.1	7.2	35.7	2.9	12.8
Printing and Publishing (27)	100.0	-	4.6	3.1	6.0	48.7	6.9	20.5	-	9.3
Paper (26)	100.0	11.8	15.4	5.5	16.9	7.7	13.5	13.0	1.1	13.9
Chemicals (28)	100.0	4.1	6.9	3.3	24.4	4.4	8.1	37.4	1.1	10.4
Miscellaneous (39)	100.0	12.4	19.8	5.3	3.0	7.6	9.8	20.9	2.2	18.7
Durable	100.0	3.0	7.1	-	4.1	8.3	6.1	* 62.9	-	9.3
Fabricated Metals	100.0	3.3	7.1	1.6	5.1	10.2	5.5	* 35.2	1.3	* 30.7
Machinery, Electric Electric (36)	100.0	1.9	7.0	1.7	18.6	12.5	3.9	43.9	1.3	9.2
Other Durable (24, 25,32,33,37,38,39)	100.0	10.8	11.5	1.7	4.4	6.6	8.9	37.8	1.7	16.5
C. Utilities (49)	100.0	-	5.2	1.6	-	11.0	4.5	* 31.2	1.1	43.9
	100.0	7.0	11.2	na	28.4	19.3	18.5	5.1	2.1	12.5

INDUSTRY GROUP (SIC No.)		OCCUPATIONAL CLUSTERS									
		Pre-Employment Training Required		Pre-Employment Training Not Required						Diverse Training Patterns	
							Low-Skill Occupations				
		Professionals (1)	Tech., Cler. and Service (2)	High-Skill White Collar (3)	High-Skill Blue Collar (4)	Other Skilled & Semi-Skilled (5)	Clerical & Sales (6)	Blue Collar (7)	Service (8)	Managers & Administrators (9)	Artists & Performers (10)
Service Industries	78.4	* 92.0	* 87.5	* 87.9	53.2	* 61.5	* 89.9	* 46.7	* 97.8	* 74.8	85.9
	100.0	13.3	16.1	5.6	4.0	9.8	18.4	5.9	13.6	13.0	-
A. Transportation (41,42, 44, 45)	4.5	1.7	2.4	1.5	5.6	8.1	2.0	* 15.2	3.0	3.7	
	100.0	-	7.7	1.6	7.3	22.4	7.3	33.3	7.4	11.3	-
B. Communications (48)	2.1	4.8	1.5	1.1	1.4	9.9	3.6	-	-	3.2	
	100.0	-	10.5	2.5	3.9	28.9	27.2	-	1.4	20.6	-
Total Trade	17.6	2.8	13.3	* 48.8	15.9	19.7	* 30.6	18.0	2.5	* 22.7	8.0
	100.0	1.8	11.0	13.8	5.3	10.5	28.1	10.1	1.5	17.7	-
C. Trade, Wholesale (50, 51)	8.2	2.3	9.9	* 27.0	7.2	9.5	9.1	12.7	-	10.8	5.8
	100.0	3.2	17.5	16.4	5.2	5.4	17.9	15.3	-	18.0	-
D. Trade, Retail	9.4	-	3.4	* 21.8	8.7	11.2	* 21.5	5.3	1.8	* 12.0	2.2
	100.0	-	5.3	11.6	5.5	14.9	37.0	5.6	1.2	17.4	-
Durable (52,55,57)	1.5	-	-	* 8.8	1.9	1.8	1.4	-	-	2.3	
	100.0	-	4.3	29.7	7.4	15.6	14.9	5.7	1.2	21.0	-
Nondurable (56,59,58)	1.7	-	-	2.7	1.4	1.9	4.2	-	-	2.0	-
	100.0	-	5.5	8.2	5.1	14.9	41.2	5.6	2.2	16.7	-
Other (53,54, balance of 55)	6.3	-	2.4	10.3	5.4	7.4	* 15.9	3.6	1.3	7.7	1.9
	100.0	-	5.5	8.2	5.1	14.8	41.1	5.6	2.2	16.7	-
E. FIRE (60-64)	10.8	6.6	* 16.8	* 25.1	-	3.3	* 21.8	-	2.8	* 15.1	
	100.0	7.0	22.4	11.6	-	3.9	32.6	-	2.8	19.2	-
F. Producer & Legal Services	10.6	* 19.8	* 19.7	9.5	1.2	3.4	7.9	1.9	* 17.2	8.5	14.6
	100.0	21.2	26.9	4.4	-	4.0	12.0	1.8	17.8	10.9	-
Business Services (73)	6.0	4.8	7.4	9.1	1.0	2.4	5.8	1.3	* 17.0	5.0	
	100.0	9.1	17.8	7.5	1.0	5.0	15.5	2.2	30.9	11.2	-
Legal Services (81)	1.8	* 8.0	6.3								
	100.0	50.0	50.0								
Misc. Bus. Serv (47, 89)	2.8	* 7.0	6.0	-	-	1.0	2.1	-	-	3.6	14.6
	100.0	28.5	31.4			4.4	12.1	2.2		17.5	1.8
G. Restaurant, Hotels and Other Consumer Services	5.4	-	-	-	10.0	-	1.9	-	* 31.9	3.8	59.0
	100.0	-	2.4	-	11.1	-	5.7	-	65.3	9.6	1.8
Restaurants, Hotels, Motels (58, 70)	4.6	-	-	-	9.4	-	1.1	-	* 30.2	3.1	
	100.0	-	-	-	12.1	-	4.0	-	72.2	9.3	-
Other Consumer Services (79)	-	-	-	-	-	-	-	-	1.7	-	* 59.0
	100.0	-	11.4	-	4.9	2.8	16.0	3.1	23.7	11.1	26.3
H. Health Services (80)	8.7	* 16.4	* 21.1	-	2.4	-	2.6	2.2	* 19.5	2.8	-
	100.0	21.7	35.4	-	1.6	4.5	4.8	2.5	24.7	4.4	-
K. Education, Welfare and Non-Profit (82,84,86)	8.9	* 34.9	6.0	-	2.1	2.8	4.4	-	15.6	8.2	3.2
	100.0	44.7	9.7	-	1.4	3.9	8.0	-	19.1	12.6	-
J. Public Administration	10.3	9.8	6.0	-	13.8	* 20.8	* 15.1	8.7	5.3	6.8	
	100.0	11.0	8.5	-	8.0	25.5	24.8	8.3	5.6	9.1	-
Federal	3.2	2.5	2.3	-	1.2	3.0	* 9.5	1.6	1.2	2.0	-
	100.0	9.2	10.3	-	2.2	11.9	48.7	4.9	4.1	8.5	-
Local	7.1	7.3	3.7	-	12.6	* 17.8	5.8	7.1	4.1	4.9	
	100.0	11.8	7.7	-	10.6	31.5	12.8	9.9	6.3	9.4	-

*See Table 10.
Source: Table 4.

this total. Four out of five jobs were thus provided by non-goods producing industries. The largest of these non-goods producing industries, wholesale and retail trade, was responsible for almost 18 percent of the city's total employment, only marginally less than the share of total manufacturing.

After allowing for some adjustments in the relative share indicated in Table 4 to account for missing (real estate in FIRE) or understated (consumer services) or probably somewhat overstated (health) data, regrouping of the City's industries would result in the following picture of New York City's employment by industry:

	%
Goods producing	22
Service producing	78
Transportation and communication	6
Trade, wholesale and retail	18
FIRE	12
Business and legal services	11
Restaurant, hotels, other consumer services	5
Health and hospitals	8
Educational services	9
Public administration exclusive of education and hospitals	9

If the consumer component of FIRE, transportation and communication and retail trade is added to restaurants, hotels and other consumer services, and this total added to business services and government, the result closely approximates the description given by Stanback and Drennan. "Business and consumer services when combined with government accounted for over 65 percent of all metropolitan area employment in 1970." 120/

OCCUPATIONAL CLUSTERS

Table 6 offers a comparative view of employment by occupational cluster in New York City and in the United States as a whole. Taken in broad groupings, the distributions are quite similar. Because of a somewhat larger proportion of professionals (Cluster 1) and technical, clerical and service people who require pre-employment training (Cluster 2), pre-employment training in New York City is required for about 26 percent of all jobs, two percentage points greater than for the country as a whole. The number not requiring such training is reduced correspondingly: 61 percent in the case of the City, compared with 63 percent in the case of the country. New York's somewhat larger share of managers reflects both the prevalence of small establishments, each with its own managers, and of large administrative headquarters. The

120/ Stanback and Drennan, loc. cit.

Table 6

Employment by Occupational Clusters, USA AND NYC

Percent of Total

Occupational Cluster	USA	New York City
Pre-employment training required:		
1. Professionals	10.5	11.4
2. Technical, clerical service	13.5	14.5
Subtotal	24.0	25.9
Pre-employment training not required:		
3. High skill white-collar	2.9	5.0
4. High skill blue-collar	10.7	5.9
5. Other skilled & semi-skilled	12.2	12.6
Subtotal	25.8	23.5
Low Skill		
6. Sales and clericals	9.9	16.2
7. Blue collar	18.4	9.9
8. Service	9.0	11.0
Subtotal	37.3	37.1
Subtotal, pre-employment not required (3-8)	63.1	60.6
Diverse Training Patterns		
9. Managers and officers	12.4	13.2
10. Artists and performers	0.5	0.3

Source: USA, Table 1 (Chapter 1); NYC, Table 5.

share of artists and performers in New York is no doubt understated, in part because a fair number appear under the category of "teacher."

Some sharp differences emerge, however from an analysis of the internal composition of these large groups. While the proportion of low-skilled workers is an identical 37 percent in both cases, there is a virtual reversal within this group of the role of blue-collar and clerical workers. Compared to the national picture, New York had little more than one-half the low-skill blue-collar jobs but three quarters again as many low-skill sales and clerical jobs. This reversal in relationship applied at the high-skilled level as well, with the city having a larger share of high-skill white-collar workers and a lower share of high-skill blue-collar workers. Clearly, the clerical "paper factories" are New York counterparts of the industrial factories found elsewhere and, if the similarities noted above hold, are a feature of other urban centers as well.

Dealing directly now with the matrix which represents the integration of the two dimensions, industry groups and occupational clusters, the question arises as to what the patterns of occupational staffing are in New York City industries. Although the OES occupational classes, as already indicated, differ from ours, the analyses offered in the various OES reports offer a useful point of departure since it is possible, at least in a limited way, to interpolate our model of occupational clusters, organized by skill level and required training time, into the OES analysis.

Overall, Table 5 reveals that, while the service industries taken as a group provide almost four out of five New York jobs, they provide an even greater share of employment in six occupational clusters (1, 2, 3, 6, 7), but considerably less in three clusters (4, 5, 8). Conversely, the production industries, which provide only one in five jobs on average, far exceed this average in these same three clusters, absorbing 53 percent of the low-skill blue-collar workers, 47 percent of the high-skilled blue-collar workers and 39 percent of the workers in Cluster 5.

Broadly speaking, the distribution of occupations among industries is determined by the techniques required to produce, market and distribute the product or service in question, techniques which reflect in part the economic geography of the city with its coastal location, limited land area and specific transportation patterns. Other determinants are the number of and proximity to final consumers, the size of establishment and the organizational structure of the industry. The last reflects not only the consolidation or separation of administrative from production divisions, but "make or buy" decisions taken within the industry. It is possible to contract out for a wide range of services, from such professional and quasi-professional services as law, accounting, engineering and computer services to production operations, as in the garment industry, or for building service maintenance. It is also possible to maintain varying combinations of in-house and external services. It should be recognized that the exercise of this option can introduce an element of artificiality into any analysis of industry-occupational staffing patterns.

Three occupational clusters, 1. Professionals, 9. Managers and 10. Artists and Performers, have been included in our analysis for the sake of completeness. They are considered now for other reasons as well. Occupational categories are not altogether rigid and may cross cluster lines. Some occupations, such as computer programmers, are in process of becoming professionalized and some managers are downwardly mobile, not only in the well-known case of the apparel industry, but in other industries as well. Finally, the fact that one in four jobs in New York City falls within these three clusters (Table 4) is sufficient reason to consider them at least briefly.

Managers. In general, managers have a large relative share where there are large administrative staffs separated from the production process; where there are large numbers of professional and technical workers; and among small establishments.

Among the production industries, the utilities industry (SIC 49) and the general building industry (SIC 15), with their large administrative organizations, have a large proportion of managers while the special trade contractors (SIC 17) with their dependence on subcontractors to exercise the managerial function, do not. Among manufacturing industries, both the food and kindred products group (SIC 20) and the chemicals group (SIC 28) have large, separate administrative headquarters in New York City. These groups, together with the printing and publishing industry (SIC 27) with its unique "product" lines (books, magazines, catalgues, etc.) which tend to be produced in separate divisions, have relatively large numbers of managers. Many small firms in the apparel industry have self-employed owner-managers, but these are not reported in the OES which is limited to wage and salary employees. 121/

Among the service industries, communications (SIC 48) has the largest share (21 percent) of managerial employment of any city industry, a reflection of the large administrative concentration in the city and the role of New York as an international communications center. Among the transportation industries (SIC 41, 42, 44, 45) the commercial airlines (SIC 45) with their administrative concentration in the city exhibit a pattern similar to communication, while the fact that smaller firms dominate the rest of transportation has the same consequence.

As a world financial center, the staffing patterns of the industries represented by the first two letters of FIRE--financial institutions such as banks, insurance and securities dealing--are of obvious importance in any analysis of New York City jobs. Banks with an average of 333 workers per establishment, are big business in a city where the overall average is closer to 50. 122/ The banking industry dominates FIRE and with its

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121/ The many small firms which dominate the "other durable manufactures," when grouped together, produce an extremely high proportion of managers.

122/ "Occupational Staffing Patterns in Selected Nonmanufacturing Industries," p. 15.

large administrative structure and numerous branches which provide employment to middle and lower level staff, it is second only to communications in its proportion of managerial employment.

Finally, the producer services group (SIC 73, 81, 89, 47) with its multiplicity of firms providing services, requires a relatively large number of managers.

Professional and Technical Workers. These categories (Clusters 1 and 2) are both numerous in large establishments (in small firms, the professional and managerial functions are frequently merged); in firms in which R & D and quality control are important; and in those firms producing complex products.

Because of the large number of engineers and technicians required to keep the service network in operation, the utilities industry (SIC 49) has probably the largest relative number of professional and technical workers among production industries. In contrast, only four percent of employment in manufacturing industries represents professionals and an equally small percent technical workers, a reflection of several factors--the small size of industrial establishment; the contracting out for such services; and the location of the machinery industry, the largest employer of professional and technical workers among manufacturing industries, outside of New York City. Among individual industries, however, the average is far exceeded by printing and publishing (which largely utilizes nonscientific professionals), chemicals and electrical machinery, the same industries which have relatively large numbers of managers. Aside from these industries, with their special technical requirements, the single most numerous professional worker in manufacturing is the accountant. 123/

Professionals are heavily concentrated in three service industries; education, health and producer services. More than one-third of all the city's professionals are teachers and they constitute almost one-half the work force in education. In health services, more than one-half of all workers are professionals and technicians, with the larger share contributed by the latter. In fact, the "technical" component of the Cluster 2 population is largely provided by health workers--RNs, PNs and various technicians--who constitute one in six of all workers in this cluster. 124/

Clericals. The largest group within Cluster 2 however, a full 70 percent, consists of clericals--secretaries, stenographers, typists, bookkeepers--who require pre-employment training. As non-industry specific occupations, the clericals of Cluster 2, together with those of Clusters 5 and 6, provide the connective tissue of the industry-occupational matrix. They are the largest single occupational group in

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123/ Several of the occupations classified in the OES report under "professional and technical," such as buyer, furrier, programmer, are included by us in Clusters 3, 4, 5 and not in either Clusters 1 or 2.

124/ Ratio computed from the original matrix.

New York City, distributed between office and plant clericals in a ratio of three to one and between those who require pre-employment training (Cluster 2) and those who do not (Cluster 5 and 6). 125/

Both absolutely and relatively, clerical employment is concentrated in the service industries. It is the largest occupational group in FIRE, ranging from 67 percent in SIC 60 (Banking) to a "low" of 57 percent in SIC 64, Insurance Agents and Brokers. In trade, clerical workers are the single largest occupational group. Wholesale trade (SIC 50, 51), with its large administrative organizations has larger proportions of both office and plant clericals than retail trade in which, given the direct sales to the consumer, "cashier" is the single largest clerical occupation.

In manufacturing, clerical workers, taken as a group, are second only to production workers, constituting about 18 percent of total employment. Since correlation analysis indicates a signficant relation between the proportion of managers and of clericals, 126/ it is not surprising that those manufacturing industries which had the largest proportion of managers--chemicals, printing and publishing, and electrical machinery--also have a large share of clericals. The smaller relative share of the apparel industry translates into large absolute numbers, distributed largely among plant clericals, such as shippers, packers and receiving clerks.

The utilities industry (SIC 49) and the transportation and communication industries, the first with its large administrative apparatus, the last, with their direct services to the public, are both, for these separate reasons, large users of clericals.

Sales. Overlapping in some respects with the clericals are the sales occupations. Considered in declining order of knowledge of the product, sales occupations include the sales representatives (also called sales associates and agents), securities and commodities brokers and insurance agents of Cluster 3; the middle-level salesmen in the fields of trade, services and construction of Cluster 5 and the sales clerks found in retail trade and elsewhere. 127/ While these are the most obvious examples, other jobs have a large selling component as well. Sales engineers, for example, included in Cluster 1 among professionals, often differ little from sales representatives. Sales representatives and, to a lesser degree, salesmen, possess a technical knowledge of the product and deal with "big ticket" items, often on a commission basis. These higher income occupations are, in practice, usually restricted to males, while the lower-skill, lower-paid sales clerks are usually female.

Since sales occupations do not require pre-employment training and employment openings are somewhat plentiful, it seemed a useful exercise to determine the numerical distribution among these various sales occupations. A complete count was made of all sales occupations listed in

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125/ See Appendix E-7.
126/ "Occupational Patterns in Manufacturing Industries," p. 42.
127/ See Appendix E-8.

all industry groups for which data were published in the OES reports, classified by job title and occupational cluster. A rough balance was found between the high-level sales representatives (48 percent) and the low-level sales clerks (40 percent). The former are concentrated in wholesale trade, FIRE and producer services, the latter in retail trade. The remaining 12 percent are salesmen, largely concentrated in manufacturing. Internal career progressions are possible, but not usual.

Production Workers. There remains the last of the OES categories--production workers--scattered among Cluster 4, High-skilled blue-collar workers; Cluster 5, Other skilled and Semi-skilled and Cluster 7, Low-skill blue-collar workers. Manufacturing, taken in toto, is the single largest employer of high-skill blue-collar workers (25 percent) followed by construction (18 percent) and local government (12 percent). In the case of the manufacturing industries, the lack of large-scale or high technology establishments in New York City results, as was shown in Table 7.2, in a relatively low use of these high-skilled workers and a greater dependence upon the semi- and low-skilled.

In manufacturing industries in New York City, 3 out of 5 workers are production workers, on average. There are fewer than average, however, in machinery, printing and publishing, chemicals and allied products industries and greater than average in apparel and textile mill products, food and kindred, fabricated metal products, furniture and fixtures, which have as high as three-quarters of their work force in this group. 128/

The high-skill blue-collar occupations are not, of course found only among the production industries. While the largest number are construction craftworkers (23 percent), the next largest are cooks and bakers (13 percent), followed by auto mechanics and printing craftworkers (8 percent each). 129/

The distribution of occupations within Cluster 5, Other skilled and semi-skilled, is even more varied. Sewers and stitchers are the largest group (23 percent), followed by police, firemen, etc. (14 percent); deliverymen and routemen (6 percent); salesmen (5 percent) and telephone craftworkers (4 percent). 130/ While low-skill blue-collar workers in Cluster 7 are 10 percent of the city's labor force, no one occupation dominates the cluster.

128/ Correlation analysis reveals an inverse relationship between the proportions of employment in administrative offices and in professional and technical occupations and the share of production workers. "Occupational Patterns in Manufacturing Industries," op. cit., p. 48.

129/ Computed from the original matrix.

130/ Computed from the original matrix.

THE INDUSTRY-OCCUPATION MATRIX

Tabular summaries of these descriptions of industry-occupational relations in New York City are provided by Tables 7, 8, 9, and 10, which are based upon the column (vertical) and row (horizontal) patterns of Table 5. While all occupational clusters are represented to some degree in all industries, there are wide differences in degree of representation. Thus, Tables 7 and 8 indicate that both manufacturing and trade provide at least 10 percent of the jobs to be found in occupational Clusters 2 through 9 but considerably less in Cluster 1, Professionals, and Cluster 8, Low-Skill service. These jobs are in fact found principally in the education and producer services industries. Construction is a major employer only of Cluster 4; High-Skill Blue-Collar Workers (18 percent), and Transportation only of Cluster 7, Low-Skill Blue-Collar (15 percent). While Local Public Administration offers significant employment in Cluster 1, Professionals, Cluster 4, High-Skill-Blue Collar, and Cluster 5, Other Skilled and Semi-Skilled, Federal employment jobs are largely low-skill clerical type of Cluster 6.

Tables 9 and 10 summarize the occupational patterns of each industry and pinpoint which clusters are of major importance. Thus, 72 percent of all restaurants and hotel employees are low-skill service workers (Cluster 8), 49 percent of all Federal employment in New York City consists of low-skill clerical and sales workers (Cluster 8), and 45 percent of all construction workers are high-skill blue-collar workers (Cluster 4). Other skilled and semi-skilled workers (Cluster 5) are integral to the operation of half the industries listed: construction, manufacturing, utilities, transportation, communication, trade, and public administration.

Table 7

Percent of Total Occupational Cluster Accounted for by Major Industry Groups

Occupational Cluster	Industry Groups
1. Professionals	Education (35%); Producer and Legal Services (20%); Health Services (16%); Public Administration (10%).
2. Technical, Clerical and Service Workers	Health Services (21%); Producer and Legal Services (20%); FIRE (17%); Trade (13%); Manufacturing (11%).
3. High-skilled White-Collar Occupations	Trade (49%); FIRE (25%); Manufacturing (12%); Producer and Legal Services (10%).
4. High-Skilled Blue-Collar Occupations	Manufacturing (25%); Construction (18%); Trade (16%); Public Administration (14%); Restaurants, Hotels and other Consumer Services (10%).
5. Other Skilled and Semi-skilled Occupations	Manufacturing (35%); Public Administration (21%); Trade (15%).
Low Skill	
6. Clerical and Sales	Trade (31%); FIRE (22%); Public Administration (15%); Manufacturing (9); Producer and Legal Services (8).
7. Blue-Collar	Manufacturing (50%); Trade (18%); Transportation (15); Public Administration (9%).
8. Service Workers	Restaurants, Hotels and Other Consumer Services (32%); Health Services (20%); Producer and Legal Services (17%); Education, Welfare and Nonprofit (16%).
9. Managers, Administrators and Supervisors	Trade (23%); Manufacturing (22%); FIRE (15%).

Source: Table 5.

Table 8

Industry Groups by Occupational Cluster Representation [a]

Industry Groups	Occupational Clusters
Construction	4
Manufacturing, total	2, 3, 4, 5, 6, 7, 9
Nondurable	3, 4, 5, 7, 9, 10
Durable	7, 9, 10
Transportation	7
Trade, total	2, 3, 4, 5, 6, 7, 9
Wholesale trade	2, 3, 7, 9
Retail trade	3, 5, 6, 9
FIRE	2, 3, 6, 9
Producer and legal services	1, 2, 3, 8, 10
Restaurants, Hotels and Other Consumer Services	4, 8
Health Services	1, 2, 8
Education, Welfare and Nonprofit Services	1, 8
Public Administration	1, 4, 5, 6
Federal	6
Local	1, 4, 5

a) Each industry accounts for at least 10 percent of the occupational cluster listed opposite it.

Source: Table 7.

Table 9

Percent of Major Industry Groups Accounted for by Ten Occupational Clusters

Industry Groups	Occupational Clusters
Construction	Cluster 4. High-Skill Blue-Collar (45%); Cluster 5. Other Skilled and Semi-Skilled Workers (14%); Cluster 6. Low-Skill Blue-Collar (13%); Cluster 7. Blue-Collar (13%); Cluster 9. Managers, Administrators and Supervisors (13%).
Manufacturing Total	Cluster 7. Low-Skill Blue-Collar (27%); Cluster 5. Other Skilled and Semi-Skilled Workers (24%); Cluster 9. Managers, Administrators and Supervisors (17%).
Nondurable	Cluster 5. Other Skilled and Semi-Skilled Workers (29%); Cluster 7. Low-Skill Blue-Collar (24%); Cluster 9. Managers, Administrators and Supervisors (11%).
Durable	Cluster 7. Low-Skill Blue-Collar (35%); Cluster 9. Managers, Administrators and Supervisors (31%); Cluster 5. Other Skilled and Semi-Skilled (10%).
Utilities	Cluster 4. High-Skill Blue-Collar (26%); Cluster 5. Other Skilled and Semi-Skilled (19%); Cluster 6. Clerical and Sales Workers (7%); Cluster 9. Managers, Administrators and Supervisors (13%).
Transportation	Cluster 7. Low-Skill Blue-Collar (33%); Cluster 5. Other Skilled and Semi-Skilled (22%); Cluster 9. Managers, Administrators and Supervisors (11%); Cluster 4. High-Skill Blue-Collar (7%); Cluster 6. Clerical and Sales Workers (7%); Cluster 8. Service Workers (7%).

Table 9
(cont'd)

Industry Groups	Occupational Clusters
Communication	Cluster 5. Other Skilled (29%); Cluster 6. Low-Skill Clerical and Sales (27%); Cluster 9. Managers, Administrators and Supervisors (21%); Cluster 2. Technical, Clerical and Services (11%).
Trade, Total	Cluster 6. Low-Skill Clerical and Sales (28%); Cluster 9. Managers, Administrators and Supervisors (18%); Cluster 3. High-Skill White-Collar (14%); Cluster 2. Technical, Clerical and Services (11%); Cluster 5. Other Skilled and Semi-Skilled (11%); Cluster 7. Low-Skill Blue-Collar (10%).
Trade, Wholesale	Cluster 2. Technical, Clerical and Services (18%); Cluster 3. High-Skill White-Collar (16%); Cluster 6. Low-Skill Clerical and Sales (18%); Cluster 7. Low-Skill Blue-Collar (15%); Cluster 9. Managers, Administrators and Supervisors (18%).
Trade, Retail	Cluster 3. High-Skill White-Collar (12%); Cluster 5. Other Skilled and Semi-Skilled (15%); Cluster 6. Low-Skill Clerical and Sales (37%); Cluster 9. Managers, Administrators and Supervisors (17%).
FIRE	Cluster 7. Low-Skill Clerical and Sales (33%); Cluster 2. Technical, Clerical and Services (22%); Cluster 9. Managers, Administrators, and supervisors (19%). Cluster 3. High-Skill White-Collar (12%).

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Table 9
(cont'd)

Industry Groups	Occupational Clusters
Producers and Legal Services	Cluster 2. Technical, Clerical and Services (27%); Cluster 1. Professionals (21%); Cluster 8. Low-Skill Service (18%); Cluster 9. Managers, Administrators and Supervisors (11%).
Restaurants, Hotels and Other Consumer Services	Cluster 8. Low-Skill Services (72%); Cluster 4. High-Skill Blue-Collar (11%).
Health Services	Cluster 2. Technical, Clerical and Services (35%); Cluster 8. Low-Skill Services (23%); Cluster 1. Professionals (22%).
Education, Welfare and Nonprofit	Cluster 1. Professionals (45%); Cluster 8. Low-Skill Services (19%); Cluster 9. Managers, Administrators and Supervisors (13%); Cluster 2. Technical, Clerical and Services (10%).
Public Administration	Cluster 5. Other Skilled and Semi-Skilled (26%); Cluster 6. Low-Skill Clerical and Sales (25); Cluster 1. Professionals (11).

Source: Table 5

Table 10

Occupational Clusters by Industry Group Representation[a)]

Occupational Cluster	
1. Professionals	Education; Health Services; Producer and Legal Services; Public Administration.
2. Technical, Clerical and Service	Health; Producer and Legal Services; FIRE; Communications; Trade, Total; Trade, Wholesale; Education.
3. High Skill White Collar	Trade, Total; Trade, Wholesale; Trade, Retail; FIRE.
4. High Skill Blue Collar	Construction; Utilities; Restaurants, Hotels and Other Consumer Services.
5. Other Skilled and Semi-Skilled	Communications; Public Administration; Manufacturing, Total; Transportation; Utilities; Trade, Retail; Trade, Total.
Low Skill	
6. Clerical and Sales	FIRE; Trade, Retail; Trade, Total; Communication; Trade, Wholesale; Public Administration; Utilities; Producer and Legal Services.
7. Blue-Collar	Transportation; Manufacturing, Total; Construction; Trade, Wholesale.
8. Service	Restaurants, Hotels, and Other Consumer Services; Education; Producer and Legal Services.
9. Managers and Administrators	Communication; FIRE; Trade; Manufacturing, Total; Construction; Utilities; Transportation; Education; Producer and Legal Services.

a) Each occupational cluster allows for at least 10 percent of the industry group opposite it.

Source: Table 9.

MEASURE OF INDUSTRY-OCCUPATION CONCENTRATION

There are cases where an occupational cluster has a large share of an industry's total employment, but because total employment in that industry is not sizeable, the industry does not absorb a large share of the total number in that occupational cluster. Thus, for example, while more than one-quarter of all utilities workers are high-skilled blue-collar (Cluster 4), only four percent of all such workers are employed in that industry. To get an indication of what can be considered the joint importance of the occupation to the industry and of the industry to the occupation, a "measure of industry-occupation concentration" has been devised. This measure (C) is simply the cross-product of the two ratios given in the individual cells of Table 7.2, divided by 100 for greater ease of handling. The larger the resulting number, the greater the relative concentration of both the occupational cluster in the industry in question and of the industry in the occupational cluster. Results are shown in Table 7.7 only where the measure of concentration (C) is at least equal to 2 (such cells are marked by an asterisk in Table 7.2).

The measure ranges from a low of 2 to a high of 22; the latter represents the cross-product of the share of low-skill service workers (Cluster 8) in restaurant and hotel employment (72 percent) and the share of the industry in that occupational cluster (30 percent) divided by 100. Other high measures of concentration occur in professional/education (16); low-skill blue-collar/manufacturing (13); other skilled and semi-skilled/apparel (12); low-skill clericals and sales/trade (9); high-skill blue-collar/construction (8). Of the 56 cells for which C is at least equal to 2, 30 have a value of less than 5 and 46 lie below the mid-point of 11. This leads to the conclusion that, while there are, as shown above, some major cases of great mutual importance between an occupational cluster and an industry, the more usual case is, within constraints, one of dispersion of occupational clusters among industries. Any major shifts in general economic activity could thus be expected to have consequences for all occupational clusters.

Table 11

Measure of Industry - Occupation Concentration (C),

Selected Industry-Occupation Cells

Industry-Occupation Cell	C
Production Industries/Low-Skill Blue-Color	13.0
Production Industries/Other Skilled and Semi-Skilled	8.7
Production Industries/High Skill, Blue-Collar	6.0
Production Industries/Managers and Administrators	4.0
Construction/High-Skill, Blue-Collar	8.0
Manufacturing/Low-Skill, Blue-Collar	13.4
Manufacturing/Other Skilled and Semi-Skilled	8.2
Manufacturing/Managers and Administrators	3.7
Nondurable/Other Skilled and Semi-Skilled	8.8
Nondurable/Low-Skill, Blue-Collar	7.8
Apparel/Other Skilled and Semi-Skilled	12.4
Miscellaneous/Low-Skill, Blue-Collar	3.4
Apparel/Low-Skill, Blue-Collar	2.8
Durable/Blue-Collar	6.1
Durable/Managers and Administrators	3.3
Other Durable/Blue-Collar	2.7
Service Industries/Low-Skill Clerical and Sales	16.5
Service Industries/Technical, Clerical Service	14.1
Service Industries/Low-Skill Service	13.3
Service Industries/Professional	12.2
Service Industries/Managers and Administrators	9.7
Service Industries/Other Skilled and Semi-Skilled	6.0
Service Industries/High-Skill, White-Collar	4.9
Service Industries/High-Skill, Blue-Collar	2.1
Service Industries/Low-Skill, Blue-Collar	2.8
Transportation/Low-Skill, Blue-Collar	5.1
Trade Total/High-Skill White-Collar	6.7
Trade Total/Low-Skill Clerical and Sales	8.6
Trade Total/Managers and Administrators	4.0

Table 11

(cont'd)

Industry-Occupation Cell	C
Trade Wholesale/High-Skill, White-Collar	4.4
Trade Retail/High-Skill, White-Collar	2.5
Trade Retail/Low-Skill Clerical and Sales	8.0
Trade Retail/Managers and Administrators	2.1
Durable/High-Skill, White-Collar	2.6
Other/Low-Skill Clerical and Sales	6.5
FIRE/Technical, Clerical and Service	3.7
FIRE/High-Skill, White-Collar	2.9
FIRE/Low-Skill Clerical and Sales	7.1
FIRE/Managers and Administrators	2.9
Producer and Legal Services, Total/Professionals	4.2
Producer and Legal Services, Total/Technical, Clerical and Services	5.3
Producer and Legal Services Total/Low-Skill Service	3.1
Business Services/Low-Skill Service	5.3
Legal Services/Professionals	4.0
Miscellaneous Business Service/Professionals	2.0
Restaurants; Other Consumer Services/Low-Skill Service	20.8
Restaurants, Hotels, Motels/ Low Skill Service	21.8
Other Consumer Services/Artists and Performers	15.5
Health/Professionals	3.6
Health/Technical, Clerical and Service	7.5
Health/Low-Skill Service	4.8
Education/Professionals	15.6
Education/Low-Skill Service	3.0
Public Administration/Other Skilled and Semi-Skilled	5.3
Public Administration/Low-Skill Clerical and Sales	3.8
Federal Public Administration/Low Skill Clerical and Sales	4.6
Local Public Administration/Other Skilled and Semi-Skilled	5.6

TRENDS IN THE NEW YORK CITY ECONOMY

This analysis of the industry-occupation structure of New York City leads finally to a consideration of both the types of training necessary to fill these jobs and of the availability of such training. Two general questions must however be addressed first: to what extent can this employment pattern be expected to continue in the future and what realistic assumptions can be made as to the size and quality of the available labor supply?

The answer to the first of these questions requires an historical reading of the trends in the New York City economy since World War II. The decline, fall and modest revival of the city's economy has become an oft-told tale; in the desperate '70s, analyses of The New York City Problem seemed one of the few visible growth industries, although it was not yet to be found in the SIC Manual. The threat of bankruptcy made "cash-flow" and "cost containment" household words, but the fiscal crisis was considered by most observers a mere symptom of the underlying New York disease which some believed intractable and others, terminal. The causes of the disease are numerous; the decline of the manufacturing base as the comparative advantage of conducting operations in New York eroded; the exchange of populations (estimated at 2 million) as the largely white middle-class moved to the suburbs on a highway system paved by Federal dollars and was replaced by the unskilled poor from the south and Puerto Rico who came to fill the jobs traditionally filled by immigrants; the departure of some corporate headquarters; the differentially high tax rates and substantial disincentives to business.

The negatives of the New York situation converged in one startling statistic--the loss of more than 650,000 jobs from 1969 to 1976, largely in labor-intensive industries which had formerly absorbed the unskilled and the non-English speaking. Already in the '50's and '60's the growth in New York City employment had not kept pace with the nation's. By the late '60's, employment increased mainly in FIRE and in government and by 1969, only in health services, banking and state government. Losses of white-collar as well as blue-collar jobs mounted; the city's unemployment rates were persistently higher than the national average. Between 1970 and 1976, population in the city declined by about 400,000, as did both the number in the prime working ages (25-44) and

the general labor force participation rate of the employable population. 131/

The decline in population, in industrial growth, investment and employment seemed to signal the onset of a "mature economy," one prone to "secular stagnation," terms painfully reminiscent of the explanations advanced for the great depression of the 1930's. 132/ New York City was seemingly not alone in its misery, just one of many older, "blighted" snowbelt cities which had lost population, jobs and Federal funds to the sunbelt. 133/

Like the heroine of a soap opera, New York City survived its trials, sadder, wiser, anxious to maintain its old advantages and to cultivate new sources of strength. A whole panoply of measures, from promotional efforts to tax abatement, has been designed to attract and retain business firms. 134/ Fortuitous forces have also helped to shore up the city's position. With the increase in "two-paycheck marriages," affluent, professional couples have chosen to live in the city rather than follow the traditional route to the suburbs, even in the absence of the energy crisis. Accepting crime, dirt and high rents for convenience of location and easy access to cultural amenities, and willing to pay high private school tuitions for the 0.7 children they expect to produce, these couples have to a modest degree created a new urban environment. This "gentrification," or displacement of the poor by the new "gentry," has largely been restricted to Manhattan below 96th Street, Long Island City and Brooklyn Heights, but will invariably spread to more marginal areas as rents rise. Ripple effects are evident with increases in the

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131/ Herbert Bienstock, "New York City's Labor Market. Past Trends, Current Trends, Current Conditions, Future Prospects," City Almanac, Vol. 12, No. 4, December 1977.

A special survey conducted by Karen Gerard of the Chase Manhattan Bank revealed that the city's population dropped by 4 percent from 1975 to 1978 to less than 7.2 million, with the Puerto Rican population declining by 5.5 percent in that same period. New York Times, May 1979, p. B2.

Questions as to the effect of illegal aliens on an accurate population count are considered below.

132/ One of the few to take a more optimistic view of the city's prospects was Eli Ginzberg. See New York is Very Much Alive. New York: McGraw-Hill, 1973.

133/ For a view that the reported shift of jobs from north to south is exaggerated, see Carol L. Jusenius and Larry G. Ledebur, A Myth in the Making: The Southern Economic Challenge and Northern Economic Decline. Washington: U.S. Department of Commerce, Economic Development Administration, 1976.

134/ See also Revitalizing the Northeastern Economy - A Survey for Action: General Report and Recommendations. Prepared by the Academy for Contemporary Problems for the Economic Development Administration. U.S. Department of Commerce, November 1977.

number of retail stores, in restaurants and in specialized personal services. The conversion of manufacturing lofts and older office space into housing units--what can be called "residentialing"--has been a related feature; it is not clear whether these incursions into older manufacturing space have reduced business opportunities. 135/

NEW YORK CITY'S EXPORT BASE

There has been increased recognition of the importance to the city's economy of that component of the service sector which can be called the "advanced" or "high" services--banking, legal, accounting, market research, advertising, computer--which are concentrated in the central business district (CBD) and are ancillary to corporate headquarters firms. Employment in these firms has more than balanced the decline in employment caused by the departure of corporate headquarters firms proper. This corporate headquarters complex

> . . .accounts for over one-fifth of all wage and salaried workers (586,000) workers and a considerably higher proportion, over one-fourth, of total payroll ($8.7 billion). As such, it represents the largest aggregation of economic activity in the City, considerably larger in terms of jobs and income than manufacturing, municipal government, or nonprofit enterprises. 136/

There has been a significant international dimension as well. The tipping of the comparative "discomfort index" has caused foreigners to prefer the random neutrality of street crime to the specificity of political terrorism, making New York City a haven for foreign investors.

The cheap dollar, cheap air fares and aggressive advertising have also combined to make tourism, as is the case in the older cities of Europe, a major industry. 137/ This development, combined with a renaissance of the entertainment industry, has helped spark the reversal of the secular decline in the hotel and restaurant industry. More than

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135/ One of the authors was present at a heated but inconclusive dispute on this matter between a former commissioner of the City Planning Commission and the Commissioner of Housing Preservation and Development.

136/ The Corporate Headquarters Complex in New York City, op. cit., p. xvi. The employment figure of 586,000 includes employment in ancillary services such as printing, hotels and the like. See Table 2.2., pp. 10-11.

137/ "Tourism Booming Along in New York," The New York Times, June 30, 1978, p. B1.

ever, New York seems entrenched in its position as thw world capital of finance, advertising, corporate headquarters, communications, international trade, culture, art and fashion. (Women's Wear Daily has been called the most influential trade journal in the world.) Finally, construction revived in 1979, with more than 25 major jobs with a value in excess of one billion dollars initiated in Manhattan alone, involving the construction and renovation of office buildings and hotels, conversion of lofts and restoration of brownstones. 138/ Even manufacturing employment has increased and there is recurrent mention of plans for an industrial park in the South Bronx, perhaps to be financed by foreign investors.

EMPLOYMENT TRENDS

While major problems remain--an aging infrastructure, extensive housing abandonment, an educational system under siege, the recent failure of the city's industrial mix to insulate the New York economy from national recessions as it once did, and some degree of automation-induced unemployment 139/--a modest rise has been registered in total New York City jobs. The first net increase in jobs since 1969 was reported in 1978, and while this gain reflected in part an increase in government hiring, there was an increase every single calendar month over the preceding year. Even manufacturing employment increased, for the first time since 1956. The total number of jobs increased sharply in January and February of 1979 over the corresponding period in 1978 and in fact, with the exception of February 1968, the one-year increase for February 1979 was the highest for that month since 1959. A total of 3,207,100 jobs for the city was reported at that time. 140/

Occupational projections have been made for New York City for the period 1974-1985 by the Division of Research and Statistics of the New York State Department of Labor, as mandated by the Vocational Education Act of 1963 and Comprehensive Employment and Training Act (CETA) of 1973. These require local labor supply and demand data so that training programs may be directed toward occupations in demand. 141/

138/ "Residentialing" of older office space according to Landauer Associates, a major real estate consultant firm, has increased the pressure for new office space. A major problem, according to the City Planning Commission, is the undue concentration of new building east of Fifth Avenue.

139/ In 1969, 12 million share days caused chaos on Wall Street, requiring three-shift employment, which incidentally, provided middle-level jobs for minorities. Computerization has led to easy handling of 30 million share days.

140/ New York State Department of Labor, Employment Trends and Labor Area Summary, New York City, both monthly. Job counts are on a place-of-work basis, unlike employment and unemployment estimates, which are on a place-of-residence basis.

141/ New York State Department of Labor, Division of Research and Statistics, Occupational Projections, New York City, 1974-1985. Labor Research Report 1978-2, January 1978.

A 10 percent decline is projected overall in total New York City employment between 1974-1985, with all major occupational groups expected to decline. Professional, technical and clerical workers are expected to decline less than this average, however, and blue-collar categories, more. Average annual job openings in the same period are estimated at 105,629 or a total of over one million in the whole period. Statewide, 90 percent of all openings are expected to originate in separations and only 10 percent from job growth. (Data inadequacies do not permit inclusion of information on occupational demand originating from current vacancies or inter-occupational or geographic transfers.) In New York City, even fewer openings are expected from growth, and these few are expected to occur among stenographers, typists and secretaries, bank tellers, computer specialty occupations and, in large number, in the health occupations. This last, to anyone familiar with the health scene in New York City, is a reminder of the difficulties of accurate forecasting, as are the long list of minus signs in the "openings due to growth" column for food services workers. 142/ The conventional wisdom indicates, however, as has been stated earlier, that the cause of openings is not a critical variable and, where large enough numbers are involved, that training for jobs, even in declining industries, is a defensible proposition. It is of some interest to note that in November 1978, 8,600 job openings were listed in the New York City offices of the State Employment Service for benchwork occupations (jewelers, spray painters, upholsterers); garment trade occupations, especially sewing machine operators; for machinists and mechanics of all kinds; for cosmetologists, truck drivers, clerical workers of all kinds, programmers and systems analysts and for teachers of commercial subjects, among others. 143/

Labor Supply. An informed analyses of the determinants of the supply of workers to these and other jobs must distinguish between stocks and flows. As has already been indicated in Chapter 5, the supply "stock" of an occupation consists of the number employed in that occupation plus the number of unemployed with the requisite skills to enter it. The supply "flow" is made up of new entrants from specific training programs, plus those from general training programs, supplemented by those who transfer from other occupations, re-entrants into the labor force and in-migrants. Flows out of this supply pool are caused by separations due to death and retirement, transfers to other occupations and emigration--factors already considered under demand. The size of the supply for the whole labor market is determined, of course, by the constraints of total population size and general labor force participation rates.

142/ Ibid., Table 2.
143/ Labor Area Summary, January 1979.

The difficulties of making an accurate count of occupational supply are well-known. Collecting data on completions in vocational education, higher education, registered apprenticeship programs, CETA programs, and proprietary schools is only the starting point. Additional information is needed on industry training programs, post-training placement and geographical and occupational mobility, information which is extremely sparse. The difficulties of supply projection are so great in fact that no attempt has been made to date to construct an apparatus similar to that used for occupational projections.

The size, complexity and openness of the New York City labor market make attempts at supply measurement particularly unpromising. New York is simultaneously a local, national and international market for professional, managerial, technical, artistic and even sales talent, a situation which makes for a certain permeability of occupational boundaries. 144/

The major inflows, hoever, already referred to aboye, were from the rural south and the Caribbean in the '50's and '60's. The cross-flows of the people coming north as the jobs went south is a much analyzed part of the New York story. 145/

A recent analysis indicates that although the south had been a net exporter of persons below the poverty level in the post-war period, that by 1967 it had shifted to overall net inmigration and between 1971 and 1976 to net inmigration of the poor. This resulted in large measure from the decline in the number of poor moving out, rather than from an increase in the number of poor inmigrants. By 1977, the northeast, on the other hand, had a net outmigration of people below the poverty level. 146/

The demographic and age aspects of recent New York City migration flows are described by Bienstock. While the black population rose by half in the '60's, there was a net outflow in the period 1970-75, making for relative stability in the black population in that five-year period. Since 1970, there has been a net outmigration of Puerto

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144/ As the nation's theatre center, New York has a large number of aspiring actors; with an unemployment rate in the neighborhood of 90 percent, actors form a steady supply of waiters "between engagements." The migrant young are part of the supply of retail sales clerks and low-skill service workers. Technology has stretched the limit of the city's labor market reach; when the telephone company required readily trained information operators, it was able to tap the services of housewives upstate.

145/ Eli Evans, "The City, South and Caribbean," The New York Times, June 26, 1978, Op Ed page, provides a useful overview.

146/ Larry H. Long, Interregional Migration of the Poor: Some Recent Changes. U.S. Department of Commerce. Current Population Reports, Series P-23, No. 73, November 1978, pp. 9-10.

Ricans from the mainland. Increases in the number of young people ages 16-24 are expected to diminish, and the number in the prime working ages is expected to remain fairly stable, with the drop in the number of whites balanced by the increasing number of blacks and other races in this age group. Labor force participation rates continued to drop in the '70's with the exception of women, whose rate remained stable. 147/

Immigration. The actual size of the city's population and of its labor force cannot be evaluated without a realistic consideration of immigrant flows. Aliens have a natural tendency to locate near their fellows, with the consequence that half of all legal immigrants to the United States have in recent years settled in just three states--New York, California and Florida--which together, have less than one-quarter of the national population. 148/ Legal immigrants are readily counted and their occupational distributions analyzed; their representation in the professions tend to be higher than is true in the native population. 149/ The labor force participation rates of some ethnic groups also tend to exceed the native. 150/

The data base on illegal or "undocumented aliens" is, by contrast, extremely fragile. Illegal aliens are either EWI ("enter without inspection"), or visitors who violate their terms of entry by working. In New York City, Hispanics who "pass" as Puerto Ricans form a large part of the illegal alien population; there are in addition indeterminate numbers of Haitians, Europeans and Asians. 151/

Estimates of the number of illegals vary widely; the Immigration and Naturalization Service puts the national total at 4 to 12 millions,

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147/ Bienstock, op. cit., pp. 9-10.

148/ David S. North and Allen Le Bel, Manpower Immigration Policies in the United States. Special Report No. 20. Washington: National Center for Manpower Policy, February 1978.

149/ There are, for example, an estimated 110,000 Asian Indians in New York City, heavily concentrated in the medical, engineering and computer fields. (Indians in Britain, in contrast, are mainly blue-collar.) Problems of adjustment of professional immigrants are analyzed by David S. North and William G. Weissert, Immigrants and the American Labor Market. Manpower Research Monograph No. 31. Washington: U.S., Department of Labor, 1974.

150/ In 1970, the percent of males in the labor force in New York City was 75 for whites, 73 for blacks, 72 for Puerto Ricans; the female rates were 49, 46 and 28. Male participation rates for Asians were: Chinese 71 (a reflection of the preponderance of older age groups); Japanese 76, Filipino 83; female rates were 51, 40 and 61. From The Forgotten Minority: Asian Americans in New York City. A Report of the New York State Advisory Committee to the U.S. Commission on Civil Rights, November 1977, p. 31.

151/ A self-protective response has been the creation of a Puerto Rican "identification" organization which issues unofficial "internal passports" to bona fide Puerto Ricans.

North and Le Bel at 3 to 6 millions, the Environmental Fund at 6 millions; the last also claims as many as 1.2 million new illegal aliens arrive yearly. 152/ Douglas S. Massey of the Office of Population Research at Princeton University estimates the national total at 4 million and urges avoidance of the common mistake of counting only those who enter while ignoring those who leave. 153/ Estimates for New York City are equally elastic, varying from one-half million to over one million. 154/ Innovative measures of the total count have included estimates of increased water consumption in public housing projects and increases in school enrollments and subway use in ostensibly declining areas. Other evidence has included the presence of unlicensed roving auto body shops and long lines at post offices to send money Home. 155/

The presence of illegal aliens has aroused passionate defense ("economic refugees") by interested employers, civil libertarians and officials of the Catholic Church. 156/ Equally passionate opposition has been registered by those who claim illegals take jobs from natives, add to crime and burden the welfare rolls. The labor force impact of illegals is not easy to determine. Undocumented aliens, it is claimed, are at the bottom of the secondary labor market, filling the low-skill service and blue-collar jobs, the dirty, unrewarding, menial tasks that natives refuse to make their life's work. While this claim is doubtless partly true, there is no way of actually determining that these are the only jobs they fill. Further, there remains the possibility that the low wages illegals accept will make the assumption that natives will refuse such work, a self-fulfilling one. There is no question, however, that such workers are both exploitable and exploited. 157/

152/ Full page ad in The Wall Street Journal, June 22, 1978, p. 11.

153/ "Hordes of 'Illegals'? No," The New York Times, May 31, 1979.

154/ Councilman Theodore Silverman of Brooklyn claims there are 850,000 illegals employed in the city, and a total illegal population of 1.3-1.5 million, 70 percent of all illegals in the entire eastern region. Report of Informal Public Hearing on Immigration, New York State Advisory Committee, February 17, 1978, pp. 248 ff. State Senator Martin J. Knorr concurs in this estimate and has co-sponsored a bill that would invoke sanctions against employers employing illegals. /Feld-Knorr (S-2252)/ There has been considerable protest against having employers enforce the immigration laws and an expressed fear that employers will "play it safe," not employing anyone who sounds foreign.

155/ The City Planning Commission has determined that Elmhurst, Queens, Post Office Zip Code 11373, has the largest concentration of both legal and illegal aliens.

156/ The Center for Migration Studies in Staten Island, Father Tomasi, Director, has been particularly active in the defense of illegals.

157/ See the National Council on Employment Policy, Illegal Aliens: An Assessment of the Issues. Washington, 1976.

While soft evidence of the anecdotal type is abundant (the $75 per week kitchen helpers who went out the window as the INS made a "sweep" while the $200 per week manager, also an illegal, coolly stood his ground), somewhat harder, if indirect evidence as to where illegals are employed is provided by a reading of the minutes of hearings held on the Feld-Knorr bill which proposed the payment of fines by employers of illegals. 158/

Among those who testified against the bill were the president of the Chinese-American Restaurant Association of Greater New York, representing 3,000 Chinese restaurants in New York City, 127 in Chinatown alone; the president of the United Furniture Workers of America; the business agent of the Fur, Leather and Machinery Workers Union; the president of the Association of Hospital Personnel Administrators of Greater New York, representing about 100 hospitals, and a representative of the ILGWU. Support for the bill came from the secretary-treasurer of the New York City Building and Construction Trade Council who claimed that as may as 10,000 illegals were employed by "runaway shops" doing building rehabilitation in the city, that illegals were getting CETA monies for training in the construction field, that workers do not know the prevailing rates and are underpaid even on federally financed projects. 159/

Further evidence on the industry/occupational distribution of illegals in New York was derived from specially held forums on the problem. 160/ The position of the ILGWU, as well as that of other unions, is that universal unionization of workers, legal and illegal alike, is the answer to exploitation. Illegals, it is clear, find work in the apparel industry--some estimates put this number as high as 30 percent of the total. Bitter complaints were voiced against INS "harassment," i.e., unannounced sweeps of factories which sometimes end with the removal of a key worker, such as the Chinese supervisor who, because he could speak several Hong Kong dialects, was indispensable to the production line.

This digression on the role of immigrants--legal and illegal--is justified by the large numbers involved. Together, they may constitute anywhere from one-quarter to one-third of the total New York City labor force, distributed among professional, technical, craft and low-skill jobs. 161/ The training for the first three categories is part of the human capital immigrants bring with them from abroad and represents an addition to the skills of the city's labor force which the city has not been required to finance.

158/ See footnote 154 above.

159/ Hearings, op. cit., pp. 70-71.

160/ "Undocumented Migrant Workers: Proposed Legislative and Labor Policies," Second Annual Forum, May 5, 1978. Sponsored by the Center for Migration Studies, The New York Labor Forum and the ILGWU. Speakers were Leonel Castillo, Commissioner, INS; Dr. Jorge A. Bustamente, ILO and Brookings; Dr. Charles B. Keely, Population Council of New York.

161/ The total size of the city's labor force is itself uncertain since an indeterminant number of illegal aliens work "off the books."

THE MATCH BETWEEN TRAINING AND OCCUPATIONAL STRUCTURE

Since New York's competitive position is to a large measure dependent upon the skills of its labor force, native and immigrant alike, the question of the city-based supply of training, relative to occupational requirements, requires attention. Table 7.3 provided a summary distribution of New York City jobs among occupational clusters. Pre-employment training was required for 26 percent of all jobs while 61 percent did not require such training and 13 percent--managers and artists and performers--had diverse training patterns. 162/ The share of the total requiring pre-employment training was higher than the national, a reflection of the role of professionals and trained technicians in the city's economy. 163/ With the exclusion of the professional jobs of Cluster 1, only those jobs located in Cluster 2, one in seven of the total, are found to require pre-employment training.

What is the match between the need for training and the supply? Detailed information on postsecondary training facilities, public and private, was provided by the Computer Based Educational Opportunities Center (CBEOC) which maintains a continuously updated facilities file of about 600 institutions offering several thousand courses. 164/

Liberal arts offerings, GED and adult education courses were eliminated to arrive at more strictly occupational training, ranging from nursing to mailroom occupations. The several thousand courses remaining were then organized according to our occupational clusters, with the following results: 165/

162/ The scant attention paid to occupations in the "artists and performers" group reflects merely the focus of our analysis. The wealth of training facilities in New York City for all aspects of the arts is well-known, as is the importance of the arts to the city's economy. See "The Arts and New York," New York Affairs, Vol. 4, No. 4, 1978.

163/ For the shift to such jobs between 1950 and 1976, see Bienstock, op. cit., p. 11.

164/ A description of the operation of the CBEOC was provided in Chapter 5. Mr. Nathan Johns, the director, and other staff members were most helpful in making materials available.

165/ All "courses," regardless of duration, semester hours, etc. were put on an equal basis. Attempts to impose rational distinctions were rapidly proven hopeless.

Cluster No.	Percent of Courses
1	3.8
2	64.7
3	3.5
4	12.0
5	3.0
6	0.6
7	1.2
8	1.3
9	0.8
10	1.1
Mixed	7.9

The fact that two-thirds of the training courses offered at the post-secondary level are concentrated on Cluster 2 jobs, which do require pre-employment training, makes good sense from a formal point of view, considerations of quality aside. That offerings for the high-skill blue-collar jobs of Cluster 4 rank second is also reflective of the increasing trend toward pre-employment training in this area.

The New York City Board of Education has also prepared estimates of labor supply by the major training suppliers and by occupational program. 166/

In fiscal year 1977, there were 31,934 "completers" of occupational educational programs with 28 percent coming out of the high schools, 19 percent from the private trade schools, 18 percent from CUNY/SUNY, 16 percent from CETA Title 1 programs, 10 percent from Board of Education adult programs and 9 percent from private and parochial secondary schools. 167/ The total number is flawed by the lack of follow-up information and the non-comprehensive nature of the available data.

Additionally flawed is the attempt to match this labor "supply" with labor "demand" because of data softness on the demand side. Even in dealing with actual openings, rather than projections, problems surface. No distinctions are made between temporary and permanent employment and the number of openings is inflated by the practice of repeating seasonal jobs each time a request appears. 168/ The analysts

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166/ New York City Regional Annual Plan, 1979-1980: Comprehenisve Occupational Education. Center for Career and Occupational Education, Board of Education of the City of New York.

167/ Ibid., pp. 11-15.

168/ The U.S. Employment Service prepares special editions of Occupations in Demand at Job Service Offices from jobs most frequently listed by employers.

of the Board of Education are well aware of these problems and of still another--the lack of correspondence between job title data and occupational training programs with the consequence that

> An occupational training program may prepare a student for entry level work in several job titles, or the openings available under a job title may require far more training/experience than high school or community college graduates could possibly have acquired. 169/

It was in fact suggested that until better quantitative information was developed, that employer surveys or qualitative sources of information be used as supplementary sources of information.

ISSUES IN TRAINING

To meet this objective, the Labor Market Information Network Project was created by the Manpower Planning Council of the Human Resources Administration and the Advisory Council for Occupational Education of the New York City Board of Education. 170/ The objective was

> ". . .using panels of employers in a variety of industries to make short-term and continous projections of jobs that will identify occupations with promising opportunities and will define employer requirements and needed job application qualifications. This proposal assumes that employers--as the hiring party--and unions--where they participate in the hiring process--are the most authoritative sources of first-hand information on who gets hired, for what jobs, and what competencies they need to be employed. 171/

The same theme was sounded in all the panels: employers were interested in hiring people who possess the three "A"s--appearance, attention and aptitude--as well as the basic literacy and numeracy skills which come from a general rather than a technical education. In the case of the mechanical trades, some type of "hands-on" experience was generally prized, but this could have been gained in unrelated fields,

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169/ New York City Regional Annual Plan, op. cit., p. 10.

170/ The principals were Donald Menzi and Eli Cohen, respectively.

171/ Edith F. Lynton and Joel R. Seldin, Employers' Views on Hiring and Training. A Non-Statistical Approach to Data-Gathering. New York: Labor Market Information Network, 1978, p. 5.

One of the authors attended the panel meetings regularly. These included office work; computer-related occupations; the banking industry; the hotel and food-service industries; building maintenance; appliance repair; the garment industry; printing; machining occupations,

the military, or in home workshops. Frequently, little pressure was exerted for paper credentials, especially where the employer himself did not have a high school diploma, but the ability to fill out a job application or do well in a job interview is now an established screening device in many firms.

The authors of the report arrived at the following general conclusions:

> New York City employers know why they have their hiring requirements and they have useful information regarding decisions about pre-employment training.
>
> Major deficiencies in the City's labor supply are all qualitative and entry-level jobs can be filled by sifting through a large enough pool of applicants.
>
> The City's overwhelming shift to a service economy has intensified the need for workers with communication and interpersonal skills.
>
> Manufacturing employment's low status in the City, coupled with lack of required skills, stands between many job seekers and available jobs.
>
> Technical skills alone are almost never enough for gaining employment, but must be supplemented by literacy, problem-solving and job interest, and in many cases public-contact skill.
>
> As skill requirements increase for higher-level jobs, many employers doubt that high school or manpower programs alone can produce job-readiness.
>
> Qualitative deficiencies in the supply of entry-level workers together with the impact of new technology where applicable, has resulted in increasing discontinuity in employment hierarchies.
>
> Technology and EEO regulations have opened new opportunities for advancement, but only for those with more than merely entry-level competencies.
>
> Knowing how to apply for a job is as important in getting hired as knowing how to do the job, or being able to learn it.
>
> High school and manpower programs, by failing to incorporate current hiring requirements, have extremely low credibility with most City employers. 172/

The number and variety of occupational education programs in the city of New York, taken in toto, are impressive; there are few promising

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172/ Employers' Views on Hiring and Training, op. cit., inside cover.

increases in labor market demand that do not provoke a response from either the public or private schools. The CBEOC has in place a carefully organized information system (detailed above), designed to reach dropouts as well as school attenders, although there is no follow-up information as yet on what actions follow upon inquiries. 173/ Complaints about quality and abuse are, however, chronic: schools which train for non-existent jobs or whose graduates cannot meet even low entry-level standards; 174/ CETA trainees more interested in stipends than training and whose post-training placement records are unimpressive; proprietary schools which survive on government-guaranteed loans to students who drop out. 175/

A satirical mathematical exercise once "proved" that the best way to catch lions in the Sahara is to strain out the sand, because after this is done, only lions remain. Analogously, when trainer's salaries, management fees and administrative overhead are strained out, what training lions remain and where are they to be found? They are most numerous when training is provided for the clerical and technical occupations of Cluster 2, whether such training is public or private, and especially when the access routes are clearly marked out. 176/

Where, on the other hand, on-the-job training, formal or informal, is the traditional route, satisfactory results are least likely to flow from formal, pre-employment training. Such programs contain a large

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173/ Telephone communication with Mr. Nathan Johns, director.

174/ "New York City Unemployed Found Unable to Fill 6,000 Skilled Jobs," The New York Times, October 2, 1977.

175/ An account of proprietary school abuses similar to the Federal Trade Commission Report is contained in the "Pooler Report," named for Rosemary S. Pooler, executive director, New York State Consumer Protection Board.

According to Mr. John Obermayer, Bureau of Proprietary Vocational Schools, New York State Department of Education, New York State has 295 licensed schools of which 152 are in New York City, and 92 registered business schools of which 43 are in the city.

New York State proprietary schools are licensed by the New York State Department of Education, if they are trade and technical schools, or registered, if they are business schools. Schools of drama, music, and fine arts are exempt from regulation. Schools which issue degrees of "associate in occupational studies" are not subject to regulation; two of the largest schools--Monroe and Taylor--are in this category.

The National Association of Trade and Technical Schools (NATTS) is the industry association.

176/ A New York City proprietary school with an excellent record of placement is a school of dental technology; students are screened for manual dexterity, given a one-week trial period and given refunds if they do not qualify. The city's dental labs absorb almost all the graduates.

amount of what machinists call "shim stock"--segments used to fill the gaps where the fit is poor--and are likely to become an expensive way of instilling a limited amount of socialized behavior.

In effect, the role of the employer as trainer is crucial for those jobs located in Clusters 3 through 8, and recent attempts to increase employer involvement are laudable even if the results, for a variety of reasons, have been uneven. Cooperative education and work-study programs need strengthening and expansion, not retrenchment, as do the Advisory Councils for Occupational Education. One of the objectives of the Labor Market Information Network was in fact the creation of permanent employer panels to provide continous labor market advice--in effect, strengthened Advisory Councils. Flexibility in permitting teenagers over the age of 16 to alternate work with school would also seem advantageous--continuing education can truly become a life-time affair and the lack of a high school diploma in the work place need not be fatal if self-fulfilling assumptions are not overworked:

> Neither the amount nor the quality of the education showed the powerful socializing effects that might have been expected. Nor did education always have the expected job payoffs. The study took a special look at the differences between those who dropped out of high school and those who graduated but did not go on to college. Contrary to the popular opinion that dropouts suffer in the job market, the study found that there were few differences between the two groups in the kinds of jobs they held. They were very similar in job status, hourly wage rates, and subjective sense of job satisfaction.
>
> The one critical difference was that five years after high school the dropouts were about twice as likely to be unemployed. This unemployment rate may reflect the fact that employers consider the high school diploma an important credential. 177/

Finally, the occupational information system itself requires some major repairs. Although some one-half billion dollars of CETA and other ETA monies are funneled into New York City, over and above all the other grants and loans for trianing purposes, and over and above the billions spent for general and occupational education on a regular basis, there exists inadequate communication among the various agencies responsible for preparing students and adults alike for the world of work. Articulation among the Board of Education, the Board of Higher

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177/ Jerald G. Bachman, Patrick M. O'Malley and Jerome Johnston, Adolescence to Adulthood: Change and Stability in the Lives of Young Men, Volume VI, Institute of Social Research monograph series, Youth in Transition. Ann Arbor, Michigan. Quoted in ISR Newsletter, Spring 1978, p. 3.

Education, CETA, the Office of Economic Development, the Office of Vocational Rehabilitation, the Mayor's Office of Juvenile Justice and even the Human Resources Administration, is grossly inadequate; duplication and overlap become the norm. Given the number of competent and sophisticated persons within these agencies, however, this situation need not be chronic; the creation of a top-level occupational education consortium might be one reasonable solution.

Informed optimism about the city's prospects rests on two factors. In the negative, the sharp drop in the birthrate in the 1960's will translate into a smaller number of young workers requiring jobs in the 1980's (ignoring, perhaps at our peril, the possibility of a continuing influx of illegal aliens). In the positive, those jobs most likely to expand are in the professional and technical fields that require a college degree; while the imposition of tuition in the city's colleges may narrow the entry door to better jobs, it does not slam it shut. For those who do not go on to higher education, a final cautionary note: pieties about training should not determine policy. If the mode and site of training are not right, if training programs confer larger benefits on the trainers than on the trainees, then we will be forced to repeat "the great training robbery" without end.

TABLES 4 AND 5: NOTE ON COVERAGE OF OES

Industry-occupational employment data has been collected through the OES Survey for five major industry sectors in the indicated reference periods:

Manufacturing Industries (September 1974)
Selected Nonmanufacturing Industries (April-June 1975)
Wholesale and Retail Trade (June 1976)
Selected Transportation and Communication Industries (June 1976)
Government: Federal (October 1974); State (September 1975); Local (September 1975) i/

Survey samples were derived from establishments covered by the New York State Unemployment Insurance Law. They were stratified by area (New York Ctiy, Remainder of State); by industry group (2-digit SIC) and by industry subgroup (3-digit SIC) and by employment-size class. All establishments with 100 or more employees were sampled while those with fewer were sampled according to a weighting pattern.

In the case of both Manufacturing Industries and Selected Nonmanufacturing Industries, survey results were published for those industries with at least 5,000 employees statewide or with at least 2,500 employees in New York Ctiy. The 1967 Standard Industrial Classification (SIC) Manual was the source of industry classifications for both groups. Results of the surveys of the Wholesale and Retail Trades and of the Selected Transportation and Communication Industries were published for those industries with at least 10,000 employees in New York State; industry classifications were derived from the 1972 edition of the SIC Manual. ii/

The occupational employment data on Federal Government establishments represent a universe count. In the case of Local Government, all establishments with 250 or more employees were included in the sample, while those with fewer were sample sequentially. State Government employment was not published for New York City.

Although flexibility was used in individual cases, on the whole survey results were published only where there was an adequate response rate and reliable data for 10 occupational lines in the industry. Although as indicated, the samples were stratified by size, the small

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i/ Published in eight volumes by the New York State Department of Labor, Division of Research and Statistics, Albany, New York, under the titles, "Occupational Patterns in Manufacturing Industries, New York State," etc. The Manufacturing Industries report appears in two volumes.

ii/ See Appendix F for SIC listing.

average size of firm in New York City makes survey results less likely to meet these statistical and publication criteria. This fact has led to limited coverage within some industry groups and total omission of others. Of the 75 industry groups listed in the Standard Industrial Classification Manual of 1967 and 1972 (see Appendix F), the following 26 were not published for New York City: iii/

SIC 16, 19, 21, 29, 30, 31, 35, 40, 46, 53, 54, 65, 66, 67, 72, 75, 76, 81, 82, 83, 92, 94, 95, 96, 97

Limited coverage occurred in the following cases:

SIC 55. Automotive dealers and gasoline service stations - only SIC 551, New and used car dealers, is covered; SICs 552, 553, 554 and 559 were omitted;

SIC 80. Medical and other health services - SIC 807, Medical and dental laboratories, and SIC 809, Health and allied services, n.e.c., are available;

SIC 89. Miscellaneous services SIC 891, Engineering and architectural services, SIC 892, Nonprofit educational and scientific research agencies and SIC 893, Accounting, auditing and Bookkeeping services are included in SIC 899; Services n.e.c. is omitted.

As an aside, it may be noted that in the case of SIC 38, Professional, Scientific and Controlling Instruments, etc. and SIC 70, Hotels, etc., data were published only for New York City and, in the case of SIC 70, to a three-digit level of detail.

Among the industry groups omitted or only partially covered were some which provide sizeable employment to occupations found in Clusters 2 through 8, the focus of our inquiry. These include SIC 72, Personal Services; SIC 75, Auto repairs; SIC 76, Miscellaneous Repair Services; SIC 806, Hospitals and SIC 82, Educational Services.

Fortunately, a preliminary publication on SIC 806, Hospitals, was made available to us by the Regional Office of the Bureau of Labor Statistics. Numbers for SICs 801-804, Health Practitioners, were derived from the Physician Distribution and Medical Licensure in the United States, 1976, published by the Center for Health Services Research and Development of the American Medical Association, and from other sources. No attempt was made, however, to obtain data for SIC 805, Nursing Care Facilities, nor SIC 808, Outpatient Care Facilities.

An occupational distribution for SIC 82, Educational Services, was constructed by us on the basis of figures obtained from the New York City Board of Education and Board of Higher Education, the Independent School Association of Greater New York, the Association of Independent

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iii/ While totals for these are included in gross totals for each major industry sector, it is usually impossible to establish staffing patterns from such data. We were able to do so however, in the cases of SIC 53 and 54.

Colleges and Universities of New York City and from the Superintendent of Schools of the Archdiocese of New York and other parochial school organizations. Estimates were also made for SIC 81, Legal Services by use of figures from local legal societies.

With these supplementary estimates, the grand total for the industry-occupation matrix comes to somewhat under 3,000,000 jobs, somewhere between 200,000 to 450,000 short of total estimated jobs held in New York City in the period covered (1974-1976).

It is not possible to arrive at any definitive conclusion as to how these missing jobs would be distributed among occupational clusters. Coverage of SIC 72, Personal Services would increase the totals of both Cluster 2, by the inclusion of cosmetologists and barbers, shoe repairers, photographers and other workers for whom pre-employment training is required, and Cluster 8 with the inclusion of low-skill service workers. Since SIC 21, Tobacco Manufacturers and SIC 29, Petroleum Refining, translate in New York City into administrative headquarters, there would be a corresponding increase in Clusters 1, 2, 3, 5, 6 and 8. Occupational data for SIC 30, Rubber and Miscellaneous Plastics, and SIC 31, Leather and leather products, would be distributed largely among Clusters 1, 5, 6 and 7. These additional numbers might have led to some decrease in the relative share of Cluster 4, High-skilled blue collar workers, but on balance, no other large disturbances seem probable. In any event, it was with the actual universe, supplemented as indicated, that the original matrix was constructed. Covering 53 2-digit industry groups and 3-digit industry subgroups and the 440 census occupations, the matrix emerged with 23,320 cells and required 30 double-pages. While it was not possible to reproduce this in entirety, Table 7-1 is a summary version of the original.

While the OES surveys undoubtedly produce the best local data, it is important to recognize that coverage is incomplete and that inclusion of gross totals without the supporting detail does not usually permit analysis of occupational staffing patterns. On the other hand, unpublished tabulations are sometimes made available by the New York State Department of Labor and other sources of local data can also be tapped.

The most strenuous aspect of our task derived from the necessity to establish a concordance between the occupational classifications used in the OES survey and the census occupations. This concordance was essential so that for once, training requirements could become the criteria by which local occupational distributions were analyzed.

PART III

APPENDIXES

APPENDIX A

TRAINING TIME: THE GENERAL EDUCATIONAL DEVELOPMENT (GED) AND THE SPECIFIC VOCATIONAL PREPARATION (SVP) SCALES

The Dictionary of Occupational Titles (DOT) defines training time as "the amount of general educational development and specific vocational preparation required for a worker to acquire the knowledge and abilities necessary for average performance in a particular job." 178/

General Educational Development: This embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges, such as language and mathematical skills. It is education of a general nature which does not have a recognized, fairly specific, occupational objective. Ordinarlly such education is obtained in elementary school, high school, or college. It also derives from experience and individual study.

A table explaining the various levels of general educational development appears on page 3 of this appendix.

In addition to the GED scale, the Dictionary of Occupational Titles has abstracted from the process of skill acquisition another variable that provides a common dimension for ranking jobs. This Specific Vocational Preparation (SVP) scale is the required training time for average performance in a specific job situation. To be sure, this is only one approximation of skill requisites, but it is a useful one.

We quote in its entirety the description of SVP: 179/

> Specific Vocational Preparation: The amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. This training may be acquired in a school, work, military, institutional, or avocational environment. It does not include orientation training required of even every fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes training given in any of the following circumstances:

178/ U.S. Department of Labor, Selected Characteristics of Occupations by Worker Traits and Physical Strength 1968: Supplement 2 to the Dictionary of Occupational Titles, 3rd edition. Washington: Government Printing Office, 1966, pp. A-5, A-6.

179/ Ibid., p. A-5.

a. Vocational education (such as high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective);

b. Apprentice training (for apprenticeable jobs only);

c. In-plant training (given by an employer in the form of organized classroom study);

d. On-the-job training (serving as learner or trainee on the job under the instruction of a qualified worker);

e. Essential experience in other jobs (serving in less responsible jobs which lead to the higher grade job or serving in other jobs which qualify).

The following is an explanation of the various levels of specific vocational preparation.

Level	Time
1	Short demonstration only.
2	Anything beyond short demonstration up to and including 30 days.
3	Over 30 days up to and including 3 months.
4	Over 3 months up to and including 6 months.
5	Over 6 months up to and including 1 year.
6	Over 1 year up to and including 2 years.
7	Over 2 years up to and including 4 years.
8	Over 4 years up to and including 10 years.
9	Over 10 years.

GENERAL EDUCATIONAL DEVELOPMENT

Level	Reasoning Development	Mathematical Development	Language Development
6	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.	Apply knowledge of advanced mathematical and statistical techniques such as differential and integral calculus, factor analysis, and probability determination, or work with a wide variety of theoretical mathematical concepts and make original applications of mathematical procedures, as in empirical and differential equations.	Comprehension and expression of a level to— —Report, write, or edit articles for such publications as newspapers, magazines, and technical or scientific journals. Prepare and draw up deeds, leases, wills, mortgages, and contracts. —Prepare and deliver lectures on politics, economics, education, or science. —Interview, counsel, or advise such people as students, clients, or patients, in such matters as welfare eligibility, vocational rehabilitation, mental hygiene, or marital relations. —Evaluate engineering technical data to design buildings and bridges.
5	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions, in books, manuals, and mathematical or diagrammatic form. Deal with several abstract and concrete variables.		
4	Apply principles of rational systems [1] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.	Perform ordinary arithmetic, algebraic, and geometric procedures in standard, practical applications.	Comprehension and expression of a level to— —Transcribe dictation, make appointments for executive and handle his personal mail, interview and screen people wishing to speak to him, and write routine correspondence on own initiative. —Interview job applicants to determine work best suited for their abilities and experience, and contact employers to interest them in services of agency. —Interpret technical manuals as well as drawings and specifications, such as layouts, blueprints, and schematics.
3	Apply common sense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.	Make arithmetic calculations involving fractions, decimals, and percentages.	Comprehension and expression of a level to— —File, post, and mail such material as forms, checks, receipts, and bills. —Copy data from one record to another, fill in report forms, and type all work from rough draft or corrected copy.
2	Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Use arithmetic to add, subtract, multiply, and divide whole numbers.	—Interview members of household to obtain such information as age, occupation, and number of children, to be used as data for surveys or economic studies. —Guide people on tours through historical or public buildings, describing such features as size, value, and points of interest.
1	Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	Perform simple addition and subtraction, reading and copying of figures, or counting and recording.	Comprehension and expression of a level to— —Learn job duties from oral instructions or demonstration. —Write identifying information, such as name and address of customer, weight, number, or type of product, on tags or slips. —Request orally, or in writing, such supplies as linen, soap, or work materials.

[1] Examples of "principles of rational systems" are: Bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, ship sailing.

APPENDIX B

OCCUPATIONAL CLUSTERS

The 440 occupations listed in the 1970 Census have been grouped into ten occupational clusters on the basis of two criteria, first, where training takes place, before employment, or on the job (including apprenticeship arrangements) and second, the average range of training necessary to the proper performance of the job. Ten clusters have been established: 180/

1. Professionals. Pre-employment training is required, usually two years or more in college, graduate and professional schools.

2. Technical, clerical and service workers. Pre-employment training of at least three months duration is required.

3. High-skill white collar occupations. Pre-employment training is not required; new entrants are increasingly recruited from the colleges and trained on the job.

4. High-skill blue-collar occupations. Pre-employment training is not required but two years or more of training after employment is usual. Apprenticeship, other formal and informal on-the-job training are included.

5. Other skilled and semi-skilled occupations requiring three months to two years training after employment.

6. Low-skill clerical and sales workers with training less than three months, entirely on the job.

7. Low-skill blue-collar workers with training less than three months, entirely on the job.

8. Low-skill service workers with training less than three months, entirely on the job.

9. Managers, administrators and supervisors: diverse training patterns.

10. Artists and performers: diverse training patterns.

180/ This description of the 10-cluster scheme also appears in Chapter 1.

312-948 0 - 80 - 9

Clusters 1, 9 and 10 have been included for completeness but the other seven clusters - 2 through 8 - are the focus of this study. Only one of these - Cluster 2 - requires pre-employment training.

In dealing with these clusters, some words of caution are in order:

o the average training time for each cluster is expressed as a range or as an open-ended interval defined only by its lower limit. The range of SVP time in Cluster 5, for example, is three months to two years. Three months may at first blush appear too high for the occupation "sewer and stitcher." A worker possessed of fair hand-to-eye coordination may learn to operate a sewing machine in a matter of days, but the speed required to "get up to the rate" may very well take three months to acquire.

o the cluster are not rigidly defined. Even under stable conditions, overlap exists, and in a technologically fluid economy boundaries tend to be permeable. Clusters 4, 5 and 7 in particular should be regarded as a continuum on the training time scale. Jobs in Cluster 7 may, where an internal labor market exists, be entry-level jobs leading to jobs in Cluster 5.

o the recent proliferation of pre-employment training courses offered by both public and private facilities blurs the lines established between pre- and post-employment training. Where post-employment training is well-established, pre-employment training may possibly offer some comparative advantage for entry.

o semantic and regional differences exist. Even meticulous task analysis cannot prevent occupational boxes from occasionally being filled with dissimilar contents. "Machinist" may represent a variety of skill levels, depending upon the degree of precision required for the manufacture of the end product. "Cooks" can be Cordon Bleu graduates or fast food specialists more properly classified as food counter workers. Some of the regional earnings disparities revealed by the Industry Wage Surveys reflect these semantic differences as well as idiosyncratic local situations.

o There is no necessary correlation between length of training time and level of earnings. Lower skilled jobs may, by virtue of quasi-monopolistic protective devices be associated with relatively high earnings. Certain unusual earnings patterns may also prevail; waiters may earn the equivalent of the BLS intermediate budget level for a family of four ($16,236 in 1976) and deliverymen and routemen may be entrepreneurial distributors with commissions that bring them into the BLS higher budget level ($23,759).

APPENDIX C

THE SPECIFIC VOCATIONAL PREPARATION (SVP) DISTRIBUTION CODE

As discussed in Chapter 2, Lloyd Temme's analysis, makes available a frequency distribution of the SVP training times of each of the 440 Census occupational classes. 181/ To summarize this distribution, we have grouped the nine SVP time intervals and further designated these groups as follows:

Levels 1-4	Low	L	(up to 6 months inclusive)
Levels 5-6	Medium	M	(over 6 months up to 2 years inclusive)
Levels 7-9	High	H	(over 2 years to over 10 years)

Application of these categories to the experienced civilian labor force reveals that about one-third are at the high SVP level, one-quarter at the medium level, and the balance, more than two in five, at the low level. Five clusters dominate the high SVP level. Ranked by the absolute number of workers in each, these clusters are:

Cluster 9 - Managers, Administrators and Supervisors;

Cluster 4 - High-Skill Blue-Collar Occupations

Cluster 1 - Professionals

Cluster 3 - White-Collar Nonprofessionals

Cluster 10- Artists and Performers

The medium SVP level includes the upper ends of two clusters:

Cluster 2 - Technical, Clerical and Service Workers requiring at least three months pre-employment training

Cluster 5 - Other Skilled and Semi-Skilled Occupations

Finally, at the low SVP level are:

- those occupations at the lowest end of the training time scale in Clusters 2 and 5
- most occupations in Clusters 6, 7 and 8

Although the SVP of a Census group may be concentrated, a sizeable residual can remain which, if it is not symmetrically distributed around the mode, indicates that the distribution is "skewed." If the residuals appear largely to the right of the mode, that is, toward higher training

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181/ Temme, op. cit.

levels, this is described as positively skewed (+), and the reverse, as negative (-).

The distribution for each occupation has been coded so as to describe two major features, average training time and the degree of skewness. A clear and preponderant frequency concentration in any time interval is described as unimodal (U), which is further designated as L(ow), M(edium) or H(igh).

A special case takes the form of a bimodal distribution. As the name indicates, there are two concentrations, rather than one, at different points in the training time scale; these may be equal or unequal in size. There appear to be two major causes of a bimodal distribution--the existence of two distinct training routes on the one hand, or, on the other hand, imprecision in defining occupations so that the underlying data are not homogenous. When the two modes are unequal in size, the greater is designated as major (Ma), the lesser as minor (Mi) and when they are of about equivalent size, as M-M; each is followed by the appropriate time (that is to say, skill-level) designation (H, M. L).

When there is no discernible concentration or pattern in the distribution, the code S for "scatter" is assigned. This has been assigned to 14 occupational classes, some of whic are a miscellany of occupations, while others simply reflect a variety of training routes.

Two examples will illustrate the use of the coding scheme. In the case of Dietitians (974), 182/ where 83 percent have two to four years of training (level 7) with the residual fairly evenly distributed, U/H was assigned. Clinical lab technologists and technicans (080) have a bimodal training distribution, with 40 percent taking 6 months to one year and 49 percent, one to two years. The residual is concentrated in the higher training levels. The assigned code Mi/M-Ma/M + indicates that the minor or smaller of the two modes (40 percent) was lower on the training time scale; that there is a greater concentration (the major mode) at a somewhat higher training level; that both are, however, within the medium range (levels 5 and 6); and that the residual has even higher levels of training (some positive skewness) which is indicated by the sign "+."

A summary of the SVP distributions within the occupational clusters by which the 1970 experienced civilian labor force was organized is given in Table C-1.1. Three of every five workers had a sufficiently uniform range of training times to place them unequivocally within a unimodal concentration, whether high, medium or low. The other two out of five held jobs reached by two (bimodal) or more (scatter) training routes.

182/ Numbers in parenthese refer to 1970 census occupational code numbers as given in Appendix D.

As might be expected, the unimodal concentration present few surprises, since, by definition, those with high skill levels have lengthy periods of job training, while those with low skill levels do not. Thus, three out of five professionals (Cluster 1), almost three out of four high-skill blue-collar workers (Cluster 4), more than nine out of ten managers (Cluster 9) and an almost equally high percentage of artists and performers (Cluster 10), are found to pursue sufficiently lengthy training routes to place them in the unimodal-high category. Managers, who in general only attain their position after an extended period of time and who, in absolute numbers, surpassed either professionals or high-skill blue-collar workers, contribute the largest portion--almost two in five--of the labor force found in this unimodally high distribution.

At the other end, the unimodal-low concentration is dominant in Cluster 8, with two in three of all low-skill service workers requiring less than three months training. There is a lesser concentration in Clusters 6 and 7, the other two low-skill occupational clusters, with some possible evidence of movement toward higher training levels indicated by the large size of the bimodal shares in both these clusters. Finally, in both Cluster 2, which requires pre-employment training, and Cluster 5, which does not, two out of five workers were found within the unimodal-medium concentration.

Clusters 1 through 8 have a degree of bimodality in their SVP distributions ranging from one-fifth to over one-half. Detailed analysis of the occupations involved was made to determine whether the underlying cause was imprecision in definition of occupations, or a true division in training routes. Seventeen different combinations of the three bimodal possibilities (M/M, Ma/Mi and Mi/Ma) taken together with the three major SVP levels (high, medium and low) emerged, represented by three aggregated groups in Table 12. A summary of some of the substantive findings follows.

A major share of the bimodality exhibited in the SVP distribution of Cluster 1 occupations is attributable to one census group, "teachers, excluding college and university" (141-145). This large and heterogeneous group includes specialty teachers of art, music, dance and crafts with varying levels and degrees of training.

One in four jobs located in Cluster 2 exhibit a bimodal distribution for a variety of reasons. Technicians (151, 155) are increasingly coming out of the junior colleges although an internal labor market still exists. This dual route is reflected in the M/M -- M/H distribution of this group. Recreation workers (101) with a current M/H - M/H distribution are moving toward a U/H distribution, with junior college the minimum entry requirement. The Mi/L - Ma/M distribution of bookkeepers (305) reflects the variety of training routes to this occupation, ranging from brief on-the-job training (Mi/L) to formal pre-employment training (Ma/M), now the major mode.

That Cluster 3 largely consists of occupations in transition to higher levels of training is demonstrated by the fact that half are

Table 12. 1970 Experienced Civilian Labor Force: SVP Distribution Within Occupational Clusters

Occupational Cluster		SVP Code: Unimodal High	Unimodal Medium	Unimodal Low	Bimodal Equal	Bimodal Major/Minor	Bimodal Minor/Major	Scattered	Total
1-Professionals	N (000)	4,757.7	22.3	--	42.4	2,785.8	--	297.2	7,905.4
	% Row	60.2	0.3	--	0.5	35.2	--	3.8	100.0
	% Column	21.2	0.2	--	4.5	18.5	--	5.3	10.5
2-Technical, Clerical & Service Workers	N (000)	1,732.7	4,298.5	1,322.1	213.9	95.7	2,210.0	246.9	10,119.8
	% Row	17.1	42.5	13.1	2.1	0.9	21.3	2.4	100.0
	% Column	7.7	45.4	10.4	22.7	0.6	24.6	4.4	13.5
3-White Collar Non-Professionals	N (000)	597.0	530.9	--	--	645.8	421.1	--	2,194.8
	% Row	27.2	24.2	--	--	29.4	19.2	--	100.0
	% Column	2.7	5.6	--	--	4.3	4.7	--	2.9
4-High-Skill Blue Collar Workers	N (000)	5,778.9	76.5	--	102.9	465.4	1,608.3	6.8	8,029.8
	% Row	72.0	1.0	--	1.3	5.7	20.0	0.1	100.0
	% Column	25.8	0.8	--	10.9	3.0	17.9	0.1	10.7
5-Other Skilled & Semi-Skilled Workers	N (000)	423.8	3,679.0	1,735.4	578.5	373.6	1,699.0	662.3	9,151.6
	% Row	4.6	40.2	19.0	6.3	4.1	18.6	7.2	100.0
	% Column	1.9	38.9	13.6	61.3	2.5	18.9	11.9	12.2
6-Low-Skill Clerical & Sales Workers	N (000)	--	255.6	2,603.1	--	2,998.7	52.7	1,570.1	7,440.2
	% Row	--	3.4	35.0	--	39.8	0.7	21.1	100.0
	% Column	--	2.7	20.5	--	19.7	0.6	28.2	9.9
7-Low-Skill Blue Collar Workers	N (000)	--	166.8	2,595.2	--	5,694.8	2,627.5	2,751.6	13,855.9
	% Row	--	1.3	18.7	--	41.1	19.0	20.0	100.0
	% Column	--	2.0	20.4	--	37.9	29.2	49.5	18.4
8-Low-Skill Service Workers	N (000)	--	--	4,468.0	5.6	1,858.5	366.0	27.1	6,725.2
	% Row	--	--	66.4	0.1	27.6	5.4	0.4	100.0
	% Column	--	--	35.1	0.6	12.4	4.1	0.5	9.0
9-Managers, Administrators & Supervisors	N (000)	8,824.1	356.9	--	--	169.5	--	--	9,350.5
	% Row	94.4	3.8	--	--	1.8	--	--	100.0
	% Column	39.3	3.8	--	--	1.1	--	--	12.4
10-Artists & Performers	N (000)	315.1	53.0	--	--	--	--	--	368.1
	% Row	85.6	14.4	--	--	--	--	--	100.0
	% Column	1.4	0.6	--	--	--	--	--	0.005
Total N		22,429.3	9,459.5	12,725.8	943.3	15,038.8	8,984.6	5,562.0	75,141.3
Percent		29.8	12.6	16.9	1.3	20.0	12.0	7.4	100.0

divided between the U/H and U/M distributions while the other half has some type of bimodal distribution. Two occupations between them account for the latter: Sales Representatives, Manufacturing (281) and Sales Representatives, Wholesale Trade (282). Both require knowledge of the product; the fact that the first of these has an Mi/M - Ma/M distribution and the second an Ma/M - Mi/M distribution indicates that greater training time is needed for the first (See Appendix E-8).

The high-skill blue-collar occupations of Cluster 4, on the other hand, exhibit little bimodality. The largest occupational category with a bimodal distribution (Mi/M - Ma/H) is Cooks, excluding Private Household (912). Commercial cooks generally receive lengthy apprenticeship training as well as formal pre-employment training, but the inclusion of some short-order cooks probably explains the Mi/M side of the distribution. Similarly, different skill levels subsumed under the same title explain the Mi/L - Ma/H distribution of Tailors (551) and Dressmakers and Seamstresses, except Factory (613). The bimodal distribution of the large group of Miscellaneous Mechanics and Repairers (491, 492, 495) on the other hand, simply reflects the disparate nature of the occupations grouped together in the Census categories.

In the case of Cluster 5 occupations, bimodality, mainly Mi/L - Ma/M, characterizes Deliverymen and Routemen (705), Ticket, Station and Express Agents (390), Payroll and Timekeeping Clerks (360) and Dispatchers and Starters, Vehicle (360), all occupations in which informal on-the-job training is increasingly supplemented by some structured post-employment training. A similar situation prevails with Salesmen of Service and Construction (285) and Expediters and Production Controllers (323). The Mi/L - Ma/H distribution of Household Appliance and Accessory Installers and Mechanics (482) reflects the variation in training routes, from informal post-employment training to vendor training to vocational-school training. (See Appendix E-9.)

One very large occupational group--Sales Clerk, Retail Trade (283)--almost alone accounts for the fact that two in five low-skill clerical and sales workers in Cluster 6 have an Ma/L - Mi/M distribution. Workers in this category generally acquire their training on the job (Ma/L) but some, particularly those with some college education, receive in-house training courses (Mi/M) in large stores. (See Appendix E-8, Sales Occupations.) Although a large number of occupations in Cluster 7 and somewhat fewer in Cluster 8 are found to have some degree of bimodality in their SVP distribution, the variation in training times are relatively small and not readily explained.

As a final comment, analysis of the distributions leads to the conclusion that changing patterns of training explained about 30 percent of bimodality. The other 70 percent simply reflected occupational overlapping, imprecise definition of terms, or random movement.

APPENDIX D

1970 CENSUS OCCUPATIONAL CATEGORIES BY TRAINING CLUSTERS

PRE-EMPLOYMENT TRAINING REQUIRED

1 - Professionals

Two Years or More of Preparation in Colleges, Graduate and Professional Schools

Census Code	Census Title	N (000)	SVP Distribution
001	Accountants According to the most recent annual survey of the American Institute of Certified Public Accountants, accounting has become the single most popular subject in American colleges; bachelor's degrees in accounting more than doubled in the five years between 1971 and 1976. Jobs exist at all levels, with the demand fed both by new professional and governmental regulations and by the needs of government itself.	720.6	U/H -
002	Architects	57.1	U/H -
004	Computer Systems Analysts	83.5	U/H +
055	Operations and Systems Researchers and Analysts (For detail, see Appendix E-4.)	80.8	U/H
006-023	Engineers "Sales engineers" who are included in this group may have lower levels of formal training than other engineers and in fact overlap with Sales Representatives, Manufacturing Industries (281) and Sales Representatives, Wholesale Trade (282) in Cluster 3.	1,256.9	U/H -
034-036	Mathematical Specialists	36.7	U/H -
042-054	Life and Physical Scientists	208.9	U/H
024, 026	Farm and Home Management Advisors	14.0	U/H
025	Foresters and Conservationists	42.4	M/M--M/H -
030-031	Lawyers and Judges	277.7	U/H
061-073	Physicians and Dentists, and Related Practitioners	541.5	U/H

Census Code	Census Title	N (000)	SVP Distribution
102-140	Teachers, College and University	496.4	U/H
141-145	Teachers, except College and University	2,785.8	Ma/M--Mi/H +
	The SVP distribution is explained in part by the inclusion of teachers of music, dance, art, with varying levels of training.		
091-096	Social Scientists	111.3	U/H
032-033	Librarian, Archivists and Curators	130.2	U/H
056	Personnel and Labor Relations Workers	297.2	S
	The SVP distribution reflects the varying levels of responsibility and corresponding training routes subsumed within this occupational category. The latter range from on-the-job training for entry-level jobs in personnel departments to college degrees--frequently with concentrations in industrial relations--to MBAs and law degrees for specialists in the areas of contract negotiations, arbitration proceedings, pensions, occupational safety and equal employment opportunity.		
100	Social Workers	222.5	U/H
086-090	Religious Workers	258.4	U/H
174	Vocational and Educational Counselors	108.2	U/H +
184	Editors and Reporters	153.0	U/H
193	Radio and TV Announcers	22.3	U/M
Total		7,905.4	

Licensing Information:

Those accountants who have high skills, known as Certified Public Accountants, are licensed in all 50 states. Similarly, Engineers in private consluting practice may elect to become Professional Engineers by a combination of experience and certification by examination, and then licensure.

Architects; Lawyers; Physicians, Dentists et al.; Elementary and Secondary School Teachers; and School Counselors are all licensed in the 50 states. Librarians are licensed in 13 states; Foresters in 10 states; and Social Workers in 6 states.

Entry Qualifications:

New entrants in the following occupations, whose skill training was formerly on-the-job, are increasingly recruited from professional schools and specialized undergraduate programs:

Foresters, Religious Workers, Social Workers, Editors and Reporters, and Radio and TV Announcers.

PRE-EMPLOYMENT TRAINING REQUIRED

2 - Technical, Clerical and Service Workers, including Apprentices

At Least Three Months' Specific Vocational Preparation

Census Code	Census Title	N (000)	SVP Distribution
074	Dietitians	41.3	U/H
075	Registered Nurses	848.2	U/H
076, 084	Therapists and Therapy Assistants	80.0	Mi/M--Ma/H
080	Clinical Lab Technologists & Technicians	120.0	Mi/M--Ma/M +
081	Dental Hygienists	17.7	U/M +
082	Health Record Technicians	11.1	U/M +
083	Radiologic Technicians	53.5	Mi/M--Ma/M
085	Health Technicians, n.e.c.	60.2	U/M
426	Dental Laboratory Technicians	27.4	U/H
921	Dental Assistants	93.3	U/M
922	Health Aides, except Nursing	124.3	Mi/L--Ma/M
923	Health Trainees	19.2	M/L--M/H
924	Lay Midwives	1.0	Mi/M--Ma/H
	With the renewed popularity of the home ("birthing center") as a childbirth facility, there has been a revival of this occupation. The bimodal SVP distribution reflects the fact that while practitioners in urban areas tend to be at the registered nurse level, some residual number in rural areas have lower levels of formal training.		
926	Practical Nurses	240.7	Mi/L--Ma/M -
	(For detail, see Appendix E-4)		
165	Embalmers	5.0	U/H
101	Recreation Workers	53.5	M/H--M/H
	The assignment of five D.O.T. numbers to this category is some indication of the range of activities and settings. The junior college degree is the minimum training requirement, but the SVP distribution indicates that a B.A. degree and even post-baccalaureate training is becoming the norm.		

Census Code	Census Title	N (000)	SVP Distribution
150	Agricultural and Biological Technicians	33.5	U/M -
151	Chemical Technicians	60.4	M/M--M/H
152	Drafters	300.6	U/H
	Training for this occupation is provided by junior colleges, vocational/technical schools, both public and private, and some apprenticeship programs. The Bureau of Apprenticeship and Training of the U.S. Department of Labor, has, together with the Federation of Professional and Technical Engineers, established national apprenticeship and training standards for drafters. The occupational supply is cyclically augmented by downwardly mobile engineers.		
153	Electrical and Electronic Technicians	164.4	U/H
154	Industrial Engineering Technicians	22.0	S
155	Mechanical Engineering Technicians	13.9	M/M--M/H
156, 162	Engineering, Science and Mathematical Technicians, n.e.c.	187.4	S
	Until the early 1960's many workers in these occupations (153-162) were promoted from the ranks of existing craft workers. With the proliferation of junior colleges, however, there has been an increase in pre-employment formal training for these occupations and a corresponding displacement of the internal labor market route.		
161	Surveyors	60.8	U/H
173	Technicians, n.e.c.	38.1	U/M
506	Opticians, Lens Grinders and Polishers	28.5	U/M
	Apprenticeship and on-the-job training, once adequate for this occupation have yielded increasingly to the pressure of licensing examinations which necessitate formal, pre-employment training in the theoretical aspects of the craft.		
645	Photographic Process Workers	66.9	M/M--M/H -
163	Airplane Pilots	53.8	U/M +
170	Flight Engineers	6.8	U/H
171	Radio Operators	28.9	Ma/L--Mi/H +
	A major source of training for these occupations is service in the armed forces; almost without exception, pilots and flight engineers on large planes come out of the military, as do a fair number of radio operators. Formal training is supplemented by a considerable amount of on-the-job training. Federal licenses are required for these occupations. The FAA licenses pilots and flight engineers, the FCC radio operators.		

Census Code	Census Title	N (000)	SVP Distribution
183	Designers This is a heterogeneous group which includes workers in various industries with such diverse titles as industrial designer, display worker, interior designer, floral designer, garment designer (a category which includes pattern makers), etc. Others frequently included but itemized separately here are architect, commercial artist, and senior drafter.	112.3	U/H +
425	Decorators and Window Dressers	74.0	U/H -
191	Photographers Continuing technological improvements tend to make equipment increasingly expensive and to require corresponding skill changes. A recent example was furnished by the introduction into television broadcasting of ENG (electronic newsgathering). News photographers using lightweight electronic cameras in place of the conventional newsfilm cameras can eliminate the taping or filming of news events and send the pictures directly to the studios.	66.0	U/H
270	Real Estate Agents and Brokers In addition to the junior and senior colleges which offer courses in real estate, proprietary institutions offer locally oriented short courses geared to licensing examinations. ACT (American College Testing) has helped develop Multi-State Broker and Salesman Examinations with local supplements geared to specific guidelines within the respective states.	265.3	U/M
363	Real Estate Appraisers	22.8	U/H
305	Bookkeepers It is not uncommon for bookkeepers to be trained on the job in small firms. Many, however, especially if they hope for employment in large firms or government, acquire formal pre-employment training in high school, business school or junior college. Increasing computerization of routine operations makes knowledge of computer operations important. The SVP distribution reflects both the variety of tasks and titles included under this title and of training times, which range from brief on-the-job training--the minor mode--to formal pre-employment training--the major mode.	1,591.5	Mi/M--Ma/M
341	Bookkeepers & Billing Machine Operators	66.8	Ma/L--Mi/M -
343	Computer & Peripheral Equipment Operators	122.0	U/M

(For details, see Appendix E-4)

Census Code	Census Title	N (000)	SVP Distribution
350	Tabulating Machine Operators	9.2	U/M
355	Office Machine Operators, n.e.c.	37.5	S
345	Key Punch Operators	287.4	U/L +
	(For details, see Appendix E-4)		
384	Telegraph Operators	13.4	U/L
391	Typists	1,021.3	U/L -
	(For details, see Appendix E-7)		
370-2	Secretaries	2,770.4	U/M
376	Stenographers	131.6	U/M
	(For details, see Appendix E-7)		
935	Barbers	171.0	U/M
944	Hairdressers and Cosmetologists	492.0	U/M

Pre-employment training for these occupations is given by proprietary schools and some vocational high schools. In recent years rapid style changes have created a need for new types of training; the required licensing examination usually reflected these changes only after considerable time lags.

Total 10,120.8

Licensing Information:

Federal licenses are required for Airplane Pilots, Flight Engineers, and Radio Operators.

The following occupations are licensed in all 50 states - Registered and Practical Nurses, Dental Hygienists, Real Estate Agents and Brokers, Barbers, Hairdressers and Cosmetologists.

The following are licensed in the indicated number of states:
Clinical Technologists and Technicians, 19 states
Radiologic Technicians, 3 states
Agricultural Technicians, specific jobs, especially in dairy states
Photographers, 19 states
Lay Midwives, 33 states

PRE-EMPLOYMENT TRAINING NOT REQUIRED

3 - High-Skill White-Collar Occupations

Census Code	Census Title	N (000)	SVP Distribution
003	Computer Programmers	166.6	U/H +
005	Computer Specialists, n.e.c.	13.2	U/H +
	(For detail, see Appendix E-4)		
164	Air Traffic Controllers	25.7	U/H -
	Trainees are selected through competitive Federal tests and receive both on-the-job and formal training of at least two to three years duration. College graduates with previous experience in any aspect of air travel have an advantage.		
192	Public Relations and Publicity Writers	75.9	U/H
195	Research Workers, not specified	118.7	U/H -
260	Advertising Agents and Salesmen	66.9	U/M
271	Stock and Bond Salesmen	99.7	U/H
281	Sales Representatives, Manufacturing Industries	421.1	Mi/M--Ma/M -
282	Sales Representatives, Wholesale Trade	645.8	Ma/M--Mi/M -
	(For detail, see Appendix E-5)		
265	Insurance Agents, Brokers & Underwriters	464.0	U/M +
326	Insurance Adjuster, Examiners and Investigators	97.2	U/H -
	(For detail, see Appendix E-10)		
	Total	2,194.8	-

This group is characterized by the fact that new entrants are increasingly recruited from the colleges and trained on the job.

4 - High Skill Blue-Collar Occupations

Two Years or More of Training after Employment

Census Code	Census Title	N (000)	SVP Distribution
401	Auto Accessories Installers	7.1	U/H
470	Air Conditioning, Heating & Refrigeration	122.0	Mi/H--Ma/H -
	(For detail, see Appendix E-9)		
471	Aircraft Mechanics	150.3	U/H
472	Automobile Body Repairers	110.9	U/H
473-474	Automobile Mechanics	836.9	U/H -

On-the-job training, including formal apprenticeship programs of the kind supported by the Bureau of Apprenticeship and Training combined with aptitude and interest in automobiles, remains a major training route to this occupation. Such training can be received in auto dealer repair shops, independent and franchised specialty shops or in the estimated half-million all-around garages and gas stations where beginners can acquire a wide range of skills. Automobile manufacturers also maintain training schools, but these are generally restricted to already skilled personnel.

Formal pre-employment training in secondary, vocational-technical and proprietary schools has become increasingly available in communities of any size. Like all such training, its efficiency can only be judged by recent placement data.

Two opposing technical trends impinge upon required skill levels. On the one hand, the increasing popularity of imported cars and of electronic systems and components necessitates a wider range of diagnostic skills while, on the other, the increasing use of replacement parts diminishes the need for complex repairs and the skill necessary to effect them. Complaints of fraud and waste in auto repairs have also led to a call for the development of diagnostic vehicle inspection separate from the repair industry; such centers would require trained specialists of a fairly high level of skill and training.

475	Data Processing Machine repairers	32.3	U/H
	(For detail, see Appendix E-4)		
480	Farm Implement Mechanics	33.1	U/H
481	Heavy Equipment Mechanics, incl. Diesel	591.4	U/H -
483	Loom Fixers	21.5	U/H

Census Code	Census Title	N (000)	SVP Distribution
484	Office Machine Mechanics	41.4	U/H
485	Radio and Television Mechanics	143.8	U/H -
	(For detail, see Appendix E-9)		
486	Railroad and Car Shop Mechanics	55.5	U/H -
491-492, 495	Miscellaneous Mechanics & Repairers	264.0	Mi/M--Ma/H -
516	Piano & Organ Tuners & Repairers	7.0	U/M
	Increasingly, pre-employment training for the occupations grouped above (401-516) is available from proprietary schools and vocational high schools.		
402	Bakers	112.7	U/H
912	Cooks, except Private Household	873.1	Mi/M--Ma/H -
	While formal training is provided by schools with national and even international reputations as well as by specialized high schools and proprietary schools, apprenticeship remains the major route to skill acquisition. It should be noted that some who call themselves cooks are more properly classified as Food Counter and Fountain Workers (Census Code 914) or Food Service Workers, n.e.c., except Private Household (Census Code 916).		
172	Tool Programmers, Numerical Control	3.1	U/H
	(For detail, see Appendix E-3)		
403	Blacksmiths	10.7	U/H
442	Forge and Hammer Workers	16.4	M/M--M/H
454	Job and Die Setters, Metal	86.5	M/M--M/H
461-462	Machinists	400.4	U/H
502	Millwrights	82.0	U/H
503-504	Molders, Metal	55.4	U/H -
514	Pattern and Model Makers, exc. Paper	39.8	Ma/H--Mi/H -
535-536	Sheetmetal Workers and Tinsmiths	170.0	U/H -
540	Shipfitters	10.7	U/H
561-562	Tool and Die Makers	217.2	U/H
635	Metal Platers	33.8	U/H -
	(For detail, see Appendix E-3)		
410-411	Brickmasons and Stonemasons	185.7	U/H -
415-416	Carpenters	938.1	U/H -
420	Carpet Installers	47.2	U/H -
430-431	Electricians	518.0	U/H
445	Glaziers	26.1	U/H
512	Paper Hangers	10.8	U/H
520-521	Plasterers	32.1	U/H
522-523	Plumbers and Pipe Fitters	416.6	Ma/H--Mi/H
534	Roofers and Slaters	64.6	U/H
550	Structural Metal Craftworkers	79.6	U/H -
560	Tile Setters	33.7	U/H -
603	Blasters and Powderworkers	8.1	U/H
	(For detail, see Appendix E-5)		

317-998 0 - 80 - 10

Census Code	Census Title	N (000)	SVP Distribution
546	Stone Cutters and Stone Carvers	6.8	S
413	Cabinetmakers	69.5	U/M
443	Furniture and Wood Finishers	22.8	U/H
422-423	Compositors and Typesetters	167.8	Mi/H--Ma/H
434	Electrotypers and Stereotypers	7.0	Mi/M--Ma/H
435	Engravers, except Photoengravers	8.8	U/H
515	Photoengravers and Lithographers	34.7	U/H -
530-531	Pressmen and Plate Printers, Printing	164.9	U/H -
	(For detail, see Appendix E-6)		
404	Boilermakers	31.7	U/H
433	Electric Power Linemen & Cablemen	103.9	U/H
525	Power Station Operators	18.4	U/H
	Some preference in hiring for occupations 404-525 is given to ex-servicemen who have acquired experience in the military.		
545	Stationary Engineers	177.0	U/H -
455	Locomotive Engineers	50.8	U/H
456	Locomotive Firemen	13.3	U/H -
551	Tailors (includes sample makers)	73.1	Mi/L--Ma/H
613	Dressmakers and Seamstresses, except factory	101.3	Mi/L--Ma/H
444	Furriers (includes cutters)	3.2	U/H
	(For detail, see Appendix E-2)		
453	Jewelers and Watchmakers	37.6	U/H -
	Jewelers receive their training from a variety of sources: technical schools, on-the-job training, apprenticeship of several years duration and, not infrequently, from a combination of all these.		
	Watchmakers and watch repairers, on the other hand, usually receive their training in technical schools and are required by some states to obtain licenses. The introduction of new types of watch mechanisms for which repair is frequently not economical may diminish the need for the traditional type of watch repairer.		
542	Shoe Repairers	31.0	U/H
	While the relatively high price levels for shoes and boots have increased the demand for repairs, the decline in the usual immigrant sources of supply for this occupation, coupled with the disinclination of young people to enter this craft, has resulted in a decrease in supply and an increase in job openings.		

Census Code	Census Title	N (000)	SVP Distribution
543	Sign Painters and Letterers	19.7	U/H
	Total	8,029.8	

In New York City and other selected locations, immigrants are an important source of skilled labor for: Brickmasons and Stonemasons, Paper Hangers, Tile Setters, Stone Cutters and Stone Carvers, Furniture and Wood Finishers, Tailors, Dressmakers and Seamstresses, Furriers, Jewelers and Watchmakers, Shoe Repairers.

PRE-EMPLOYMENT TRAINING NOT REQUIRED.

5 - Other Skilled and Semi-Skilled Occupations

Three Months to Two Years Training After Employment

Census Code	Census Title	N (000)	SVP Distribution
261	Auctioneers	5.3	U/M
284	Salesmen, Retail Trade	466.7	U/M -
285	Salesmen of Services & Construction	236.6	M/L--M/M
	(For detail, see Appendix E-8)		
315	Dispatchers and Starters, Vehicle	61.6	Mi/L--Ma/M
321	Estimators & Investigators, n.e.c.	269.2	S
323	Expediters & Production Controllers	207.1	M/L--M/M
334	Meter Readers, Utilities	33.8	U/L
360	Payroll and Timekeeping Clerks	160.8	Mi/L--Ma/M
361	Postal Clerks	299.8	U/L +
362	Proofreaders	29.8	U/L +
364	Receptionists	319.4	U/M
375	Statistical Clerks	215.3	Mi/L--Ma/L +
381	Stock Clerks and Storekeepers	474.6	U/M
390	Ticket, Station and Express Agents	100.8	Mi/L--Ma/M
	(For detail, see Appendix E-7)		
382	Teacher Aides, exc. School Monitors	135.0	Mi/L--Ma/L
954	Welfare Service Aides	15.0	Mi/L--Ma/H

Census Code	Census Title	N (000)	SVP Distribution
412	Bulldozer Operators	98.0	U/M
424	Cranemen, Derrickmen, & Hoistmen	160.8	U/M
436	Excavating, Grading, & Road Machine Operators, exc. Bulldozer	251.7	U/M
614	Drillers, Earth	62.5	S
421	Cement and Concrete Finishers	78.4	U/M
440	Floor Layers, exc. Tile Setters	22.8	U/M
601	Asbestos and Insulation Workers	26.0	M/L--M/M
605	Chainmen, Rodmen, & Axmen; Surveying	12.5	U/L
615	Dry Wall Installers & Lathers	49.3	U/M
	(For detail, see Appendix E-5)		
450	Inspectors, Scalers, and Graders; Log and Lumber	19.1	U/L
452	Inspectors, n.e.c.	119.6	U/M +
482	Household Appliance & Accessory Installers & Mechanics	125.6	Mi/M--Ma/H
	(For detail, see Appendix E-9)		
510-511	Painters, Construction & Maintenance	363.0	U/H -
563	Upholsterers	63.0	Ma/L--Mi/H
	While on-the-job training is the usual training path, both public vocational education and proprietary school offerings are available in the New York City area.		
575	Craftsmen & Kindred Workers, n.e.c.	89.5	S
644	Painters, Manufactured Articles	123.2	Mi/M--Ma/H -
552	Telephone Installers and Repairmen	240.6	U/M
554	Telephone Linemen and Splicers	53.1	U/H -
	To get the job is to get the training for these occupations since formal post-employment training by the employer is the norm. Physical fitness, experience in the military and referral by current employees are assets in obtaining employment. The affirmative action plan in the Bell system makes it possible for employees in noncraft occupations to qualify for training.		
446	Heat Treaters, Annealers and Temperers	22.1	U/L
622	Furnacemen, Smeltermen and Pourers	65.7	Ma/L--Mi/M +
626	Heaters, Metal	7.3	M/L--M/L ±
666	Stationary Firemen	101.5	M/L--M/M
501	Millers; Grain, Flour and Feed	7.7	U/H -
631	Meat Cutters and Butchers, exc. Mfg.	208.1	U/M
633	Meat Cutters & Butchers, Mfg.	70.3	U/M

Census Code	Census Title	N (000)	SVP Distribution
680	Welders and Flame-Cutters (For detail, see Appendix E-3)	571.1	U/M -
661	Sailors and Deckhands	30.6	Ma/L--Mi/M +
701	Boatmen and Canalmen	5.5	U/M
703	Bus Drivers	242.4	U/M
704	Conductors & Motormen, Urban Rail Transit	10.0	U/M
705	Deliverymen and Routemen	632.6	Mi/L--Ma/M
950	Housekeepers, exc. Private Household	105.8	Ma/M--Mi/H -
405	Bookbinders (For detail, see Appendix E-6)	35.5	U/M
505	Motion Picture Projectionists	15.9	U/M
653	Precision Machine Operatives, n.e.c.	74.6	S
636	Milliners	2.3	U/M
663	Sewers and Stitchers	941.7	U/L
673	Weavers (For detail, see Appendix E-2)	50.3	U/M
961	Firemen, Fire Protection	180.4	U/M +
964	Policemen and Detectives	376.6	U/L +

Entry into both these protective service careers depends on passing the screening examinations and getting on the appointments list. The necessary training is then received after employment.

In line with the increased professionalization of these occupations, community colleges and technical institutes are offering both pre- and post-employment training. For the first time in the history of its apprenticeship program, the U.S. Department of Labor in 1977 approved law enforcement work as an apprenticeable occupation, beginning with one thousand candidates in the first year. The program is particularly intended for small geographic areas that do not have police academies or special training facilities.

640	Mine Operatives, n.e.c.	166.5	S
662	Sawyers	108.3	Ma/L--Mi/M
761	Lumbermen, Raftsmen, and Woodchoppers	93.1	Mi/L--Ma/M
	Total	9,151.6	

6 - Clerical and Sales Workers

Census Code	Census Title	N (000)	SVP Distribution
262	Demonstrators	41.0	Ma/L--Mi/L
264	Hucksters and Peddlers	124.5	Ma/L--Mi/L +
266	Newsboys	68.5	U/L
283	Sales Clerks, Retail Trade	2,363.5	Ma/L--Mi/L +
	(For detail, see Appendix E-8)		
301	Bank Teller	255.6	U/M
303	Billing Clerks	106.8	U/L
310	Cashiers	870.3	U/L +
311	Clerical Assistants, Social Welfare	1.3	U/L +
313	Collectors, Bill and Account	52.7	Mi/L--Ma/L +
314	Counter Clerks, except Food	234.0	S
320	Enumerators and Interviewers	71.3	U/L +
325	File Clerks	382.8	U/L +
330	Library Attendants and Assistants	128.0	U/L
385	Telephone Operators	428.8	U/L +
394, 395	Miscellaneous Clerical Workers	1,336.1	S
	(For detail, see Appendix E-7)		
331	Mail Carriers, Post Office	256.9	U/L
332	Mail Carriers, except Post Office	129.8	U/L +
333	Messengers and Office Boys	59.2	U/L +
374	Shipping and Receiving Clerks	429.7	Ma/L--Mi/M
383	Telegraph Messengers	n.a.	U/L
392	Weighers	41.2	U/L +
342	Calculating Machine Operators	37.4	U/L
344	Duplicating Machine Operators	20.8	U/L +
	(For detail on the three preceding groups, see Appendix E-8)		
	Total	7,440.2	

Census Code	Census Title	N (000)	SVP Distribution
533	Rollers and Finishers, Metal	21.0	S
602	Assemblers	1,042.5	Ma/L--Mi/L +
604	Bottling and Canning Operatives	55.0	U/L
621	Filers, Polishers, Sanders & Buffers	124.1	Ma/L--Mi/L +
665	Solderers	44.8	Ma/L--Mi/L +
	(For detail, see Appendix E-3)		
611	Clothing Ironers and Pressers	196.6	Mi/L--Ma/L
612	Cutting Operatives, n.e.c.	182.5	Mi/L--Ma/L +
620	Dyers	24.6	U/L +
	(For details, see Appendix E-2)		
630	Laundry and Dry Cleaning Operatives, n.e.c.	176.7	Mi/L--Ma/L +
624	Graders & Sorters, Manufacturing	44.6	U/L +
625	Produce and Graders & Packers, except Factory and Farm	33.1	U/L
634	Meat Wrappers, Retail Trade	47.4	U/L
643	Packers & Wrappers, except Meat and Produce	563.0	U/L +
641	Mixing Operatives	71.9	Mi/L--Ma/L -
640	Drill Press Operatives	76.5	U/L +
651	Grinding Machine Operatives	139.7	Ma/L--Mi/H +
652	Lathe & Milling Machine Operatives	144.8	Ma/L--Mi/M +
656	Punch and Stamping Press	179.0	U/M -
660	Riveters and Fasteners	28.7	U/L +
664	Shoemaking Machine Operatives	65.4	Ma/L--Mi/L +
	(For details, see Appendix E-3)		
670	Carding, Lapping, & Combing Operatives	20.8	Mi/L--Ma/L +
671	Knitters, Loopers, and Toppers	30.9	S
672	Spinners, Twisters, and Winders	163.7	Mi/L--Ma/L +
674	Textile Operatives, n.e.c.	185.7	Mi/L--Ma/L +
681	Winding Operatives, n.e.c.	63.7	Mi/L--Ma/L +
610	Checkers, Examiners, and Inspectors; Manufacturing	734.4	Ma/L--Mi/L +
642	Oilers and Greasers, exc. Auto	49.3	U/L +
690, 692, 694, 695	Machine Operatives, n.e.c.	2,689.4	S
623	Garage Workers & Gas Station Attendants	451.2	U/L +
764	Vehicle Washers & Equipment Cleaners	128.7	Ma/L--Mi/L +

Census Code	Census Title	N (000)	SVP Distribution
706	Fork Lift and Tow Motor Operatives	228.4	U/L +
710	Motormen; Mine, Factory, Logging Camp, etc.	10.3	S
711	Parking Attendants	31.2	U/L
712	Railroad Brakemen	47.4	U/L
713	Railroad Switchmen	53.1	Ma/L--Mi/L +
714	Taxicab Drivers and Chauffeurs	159.5	U/L +
715	Truck Drivers	1,463.7	Ma/L--Mi/L +
754	Garbage Collectors	74.2	U/L +
763	Teamsters	7.8	U/M
740	Animal Caretakers, except farm	48.4	Mi/L--Ma/L +
752	Fishermen and Oystermen	30.2	Mi/L--Ma/L +
755	Gardeners and Groundskeepers, exc. Farm	325.8	Ma/L--Mi/L +
822	Farm Laborers, Wage Workers	812.8	Mi/L--Ma/M +
823	Farm Laborers, Unpaid Family Worker	100.3	Mi/L--Ma/L
824	Farm Service Laborers, Self-Employed	3.9	U/L
750	Carpenters' Helpers	51.3	U/L +
751	Construction Laborers, except Carpenters' Helpers	641.9	Ma/L--Mi/L +
780, 785	Miscellaneous & Not Specified Laborers	622.6	Ma/L--Mi/L +
753	Freight and Material Handlers	574.2	Mi/L--Ma/L +
760	Longshoremen and Stevedores	50.5	Ma/L--Mi/M +
762	Stock Handlers	625.9	U/L +
770	Warehousemen, n.e.c.	112.8	Ma/L--Mi/L +
Total		13,855.9	

8 - Service Workers

Census Code	Census Title	N (000)	SVP Distribution
901	Chambermaids and Maids, except Private Household	217.7	U/L +
902	Cleaners and Charwomen	458.3	U/L +
903	Janitors and Sextons	1,263.5	Ma/L--Mi/L +
943	Elevator Operators	38.6	U/L +
910	Bartenders	197.7	U/L
911	Busboys	107.1	U/L
913	Dishwashers	185.9	U/L
914	Food Counter and Fountain Workers	156.7	U/L
915	Waiters	1,110.3	U/L
916	Food Service Workers, n.e.c., except Private Household	343.3	Ma/L--Mi/L +
925	Nursing Aides, Orderlies & Attendants	752.0	U/L
931	Airlines Stewardesses	34.8	U/L
932	Attendants, Recreation and Amusements	80.6	Ma/L--Mi/L +
933, 945	Attendants, Personal Service, n.e.c.	66.0	Ma/L--Mi/L +
934	Baggage Porters and Bellhops	20.3	U/L +
941	Bootblacks	4.1	U/L
942	Child Care Workers, except Private Household	132.7	U/L +
952	School Monitors	27.1	S
953	Ushers, Recreation and Amusement	14.6	U/L +
960	Crossing Guards and Bridge Tenders	43.3	U/L +
962	Guards and Watchmen	331.8	Mi/L--Ma/L +
963	Marshals and Constables	5.6	M/L--M/L
965	Sheriffs and Bailiffs	35.0	U/L
980	Child Care Workers, Private Household	242.8	U/L
981	Cooks, Private Household	34.2	Mi/L--Ma/M
982	Housekeepers, Private Household	105.1	Ma/L--Mi/M +
983	Laundresses, Private Household	11.7	U/L
984	Maids & Servants, Private Household	704.4	U/L +
Total		6,725.2	

9 - Managers, Administrators and Supervisors

Census Code	Census Title	N (000)	SVP Distribution
201	Assessors, Controllers, and Treasurers; Local Public Admin.	28.5	U/H
222	Officials and Administrators; Public Administration, n.e.c.	241.9	U/H -
224	Postmasters and Mail Superintendents	34.7	U/H -
202	Bank Officers and Financial Managers	315.7	U/H
210	Credit Men	62.8	U/H
203	Buyers and Shippers, Farm Products	20.9	U/H
205	Buyers, Wholesale and Retail Trade	180.7	U/H
225	Purchasing Agents and Buyers, n.e.c.	165.2	U/H
211	Funeral Directors	35.9	U/H
212	Health Administrators	85.3	U/H
223	Officials of Lodges, Societies & Unions	48.7	U/H -
245	Managers and Administrators, n.e.c.	3,528.8	U/H -
213	Construction Inspectors; Public Administration	19.1	U/M
215	Inspectors, exc. Construction, Public Administration	83.1	Ma/M--Mi/H -
220	Office Managers, n.e.c.	219.2	U/H -
312	Clerical Supervisors, n.e.c.	112.3	U/H -
441	Foremen, n.e.c.	1,599.0	U/H
231	Sales Manager and Department Head Retail Trade	215.3	U/H
233	Sales Managers, exc. Retail Trade	256.9	U/H
221	Officers, Pilots and Pursers, Ship	25.9	U/H
226	Railroad Conductors	41.5	U/H -
235	School Administrators, College	38.8	U/H
240	School Administrators, Elementary and Secondary	172.9	U/H

Census Code	Census Title	N (000)	SVP Distribution
216	Managers & Superintendents, Building	86.4	Ma/M--Mi/H
230	Restaurant, Cafeteria & Bar Managers	330.2	U/M
940	Boarding & Lodging Housekeepers	7.6	U/M +
801	Farmers (Owners and Tenants)	1,299.3	U/H -
802	Farm Managers	60.8	U/H -
821	Farm Foremen	33.1	U/H -
Total		9,350.5	

10 - Artists and Performers

Census Code	Census Title	N (000)	SVP Distribution
175	Actors	14.1	U/H -
180	Athletes and Kindred Workers	53.0	U/M +
181	Authors	26.0	U/H -
182	Dancers	6.9	U/H
185	Musicians and Composers	96.5	U/H
190	Painters and Sculptors	107.5	U/H
194	Writers, Artists, and Entertainers, n.e.c.	64.1	U/H
Total		378.1	

APPENDIX E-1

HEALTH CARE OCCUPATIONS

In the last seven decades there has been an explosive increase in the number of health care occupations:

> In 1910 there were essentially only three members of the health care team--physicians, nurses and aides. By 1974 the figure had risen to well over 450 individual health care occupations, and the most current estimate puts the figure at 600. 183/

In terms of the quantity and quality of required formal training, physicians, dentists, RNs, etc., are on the high end of the training scale, nurses' aides, orderlies, attendants and other entry-level health occupations, on the low. 1970 Census figures indicate that of almost 3 million persons in the industry-specific health care occupations, 848,000 were registered nurses, 752,000 were unskilled aides (with an SVP of 4 or less), 118,000 were dietitians and therapists, leaving about 745,000 medium-skill level occupations, defined as those with required training time of over 6 months up to and including two years (Table 13).

In this categorization by skill level, the fact that distinctions are not hard and fast cannot be overemphasized. According to two long-time students of health care occupations,

> . . .it should be noted that there is a tremendous overlap in the performance of medical functions among all levels of health personnel, from the physician to the registered nurse to the entry-level health employee. 184/

In the past decade the training patterns for both medium and low-skill level occupations, particularly the former, have reflected two significant changes--an increase in required training time and a shift in source of training from employers (hospitals and laboratories, etc.) to formal educational institutions such as the junior college. These trends were the product of a number of interacting factors, the most important of which were federal initiatives in the health field. The Medicaid and Medicare programs not only stimulated an explosive increase in the demand for health services and (thus) for the personnel needed

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183/ Harold M. Goldstein and Morris A. Horowitz, Entry-Level Health Occupations, Development and Future. Baltimore: Johns Hopkins University Press, 1977.

184/ Ibid.

Table 13. Employment in Industry-Specific Health Care Occupations, 1970

	Numbers (000)
Physicians, Dentists and Related (excluding Veterinarians)	522.4
Physicians	280.6
Dentists	92.8
Optometrists	17.6
Pharmacists	111.2
Podiatrists	6.0
Chiropractors	13.5
Health Practioners, n.e.c.	0.7
Registered Nurses	848.2
Dietitians, Therapists	118.4
Therapists	77.1
Dietitians	41.3
Health Technologists and Technicians	265.3
Clinical Laboratory Technologists & Technicians	120.0
Radiologic Technologists & Technicians	53.5
Dental Hygienists	17.7
Health Record Technologists & Technicians	11.1
Therapy Assistants	2.9
Health Technologists & Technicians, n.e.c.	60.2
Health Service Workers	1,230.5
Practical Nurses	240.7
Dental Assistants	93.3
Health Aides, excluding Nursing	124.3
Health Trainees	19.2
Nursing Aides, Orderlies & Attendants	752.0
Lay Midwives	1.0
Total	2,984.9

Source: U.S. Department of Commerce, Bureau of the Census, Occupational Characteristics. 1970 Census of Population, Table 1.

to deliver these, but regulated as well the conditions to be met by participating institutions, thus determining in part the level of training needed for "qualified personnel." Even antedating these initiatives on the demand side were programs intended to increase the supply of health personnel. The Manpower Development and Training Act (MDTA) of 1962 provided institutional training--mainly at the secondary level and with most success in the category of licensed practical nurse (LPN), as well as on-the-job training (OJT) for entry level jobs and for some categories of aides.

The Allied Health Professions Personnel Training Act of 1966 was the first to concentrate on occupations in the health field which did not require post- baccalaureate professional training. The Act and its subsequent amendments provided funds for the expansion and improvement of training facilities at the postsecondary two- and four-year levels, but "did not recognize the need for funding programs below the associate degree level." 185/ Quantitatively, the Act was most stimulative to the medical technologist and dietitian programs at the 4-year level and to the dental hygienist and X-Ray technician programs at the 2-year level. 186/ Overall, the majority of eligible disciplines were funded by the 1966 Act at the associate degree level. 187/

The role of postsecondary institutions in providing health training was reinforced by the 1968 Amendments to the Vocational Education Act of 1963, as these were interpreted by the Ad Hoc Committee on Health Occupations of the Office of Education. Health occupations suitable for vocational education were defined as those required to support the health professionals, and the approved programs went up to and included those at the associate degree level. Vocational education for the health occupations at the secondary school level has been in fact largely concentrated on such entry level jobs as nurses' aide. Postsecondary and adult education has benefited most from vocational education funding and on a national basis has provided about 82 percent of the health occupation enrollees. 188/

These efforts to improve the quality of health training occurred in the mid-sixties at a time of rapid general increase in attendance at the nation's postsecondary educational institutions. The disparity between the general educational trends and those applying to health

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185/ Tom Connelly, Jr., The Role of Vocational Education in the Preparation of Health Manpower - A Mission of Conflicting Policies. Ph.D. Dissertation, University of Kentucky, December 1, 1975, p. 12.

186/ Tom Connelly, Jr., "Allied Health Personnel Education and the Junior College Concept," American Journal of Medical Technology, 38 (April 1972), p. 119.

187/ Tom Connelly, Jr., "Manpower Policy, Health Manpower and the Junior College." Eastern Kentucky University, April 1971 (mimeo), p. 23.

188/ Connelly, The Role of Vocational Education in the Preparation of Health Manpower, op. cit., p. 19.

workers caused unease in some official circles:

> This distribution of career opportunities /in the health occupations/ shows little relation to the general education aspirations of young people today--most generally stated in terms of completion of junior college, senior college, or graduate work. In 1965, over 45 percent of all persons 18-21 years of age were enrolled in institutions of higher education. Fig. 2 /the medical services pyramid/ suggests strongly the need for changes in the educational structure for the health occupations to bring it into the main stream of educational patterns. 189/

This attitude meshed well with the efforts of professional and credentialling organizations to establish minimum qualifications and to impose standards of training either through insistence on formal education or program accreditation controls, or through the use of formally recognized measures of competence--certification, registration or membership in professional organizations, or government licensure. The fact that these standards are not always directly work-related creates new problems:

> Education requirements, training and experience requirements, and certification and licensing requirements are common methods of excluding or limiting part of the potential supply of workers. ...Are these hiring requirements valid in terms of the functions to be performed? In many cases validity would be difficult to prove because the end product, the health of the patient, is difficult to measure and is always dependent on the work of various groups. However, there are significant examples of hospitals where education and training requirements have been lowered without any effect on patient care. 190/

Other problems arose from the increasing use of credentialling:

> State licensure of the health occupations had evolved into a system of varying requirements, responsibilities, and controls that tends, in many instances, to impede effective utilization of health personnel, to inhibit geographic and career mobility, and to foster variable licensure standards and procedures in different regions of the country. 191/

189/ U.S. Department of Health, Education and Welfare, Education for the Allied Health Professions and Services. Report of the Allied Health Professions Education Subcommittee of the National Advisory Health Council. Washington: Government Printing Office, 1967.

190/ Goldstein and Horowitz, op. cit., p. 2.

191/ U.S. Department of Health, Education and Welfare, Credentialling Health Manpower. Washington: Government Printing Office, July 1977, p. 4.

Further, employer-supplied training, traditionally more job-specific, did not provide the general education made available by the colleges. The hospitals were eager in any event to relinquish these items of cost which are not directly reimbursable and when indirectly reimbursable, only partially so. Equally eager to take these programs over and to embody them in a larger general package were the postsecondary institutions-junior and community colleges and proprietary institutions--who were pleased to expand into new curriculum areas. Nowhere was this transition achieved so speedily, with predictably attendant costs and benefits, as in nursing education:

> The speed with which nursing education has moved from the service to the collegiate setting is probably unparalleled in the United States. . .the nurse trained in a hospital setting is immediately prepared to offer hospital-oriented services in that hospital in an effective manner upon the completion of training. In contrast. . ./the/ break-in period for nondiploma graduates is often cited by hospital administrators in their appeals for attention to the "basics" of nursing. 192/

Some indication of the rapidity with which two-year institutions emerged as providers of health education is given by the fact that between 1967 and 1970 the number of junior colleges eligible for funding under the AHPT Act tripled 193/ and that "percentagewise the junior colleges' growth has been almost six times that of the senior colleges in terms of becoming training centers for allied health as defined by HEW." 194/ By 1967, one year after passage of the Act, more than one in five of all curricula offered in junior colleges were health-related, most with clinical affiliations with hospitals. Where extensive networks of junior colleges were in existence, as in California and Florida, there was an immediate expansion into these areas. In other areas, such as New York City where open admissions coincided with this development, Bronx and Hostos community colleges became major institutional providers of training for the health occupations. When the recession of the early seventies reinforced the emerging secular decline in demand for health services, it was difficult to dissuade students from entering the health field, in part because staying in school became a rational course of action when jobs were scarce since the opportunity cost (income foregone) of school attendance was low.

In New York City the unions representing health workers added to the increased demand for training as well. District Council 37, repre-

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192/ James T. McGill, "State-Level Policy Determination for Nursing Education," in Nursing Personnel and the Changing Health Care System, Michael Millman, ed. Cambridge, Mass.: Ballinger, 1978, p. 85.

193/ Connelly, "Manpower Policy, Health Manpower and the Junior College," op. cit., p. 23.

194/ Connelly, "Allied Health Personnel Education and the Junior College Concept," op. cit., p. 123.

sentative of the municipal hospital employees, cosponsored (with the Hospital Corporation) the federally funded upgrading program for licensed practical nurses, and Local 1199, representing employees of voluntary hospitals, subsidized members who sought additional formal training. 195/

In sum, a number of forces interacted to induce the expansion in training time, the increase in specialization and formalization and the shift in locus of training to formal educational institutions which marked the health boom of the last decade. As might be expected, the changes have had mixed effects, the ills including waste of resources through duplicative and overlapping offerings:

> The acceptance of health occupations programs has perhaps been greatest by those indstitutions whose primary mission has been the provision of salable skills to students, namely community colleges and vocational-technical schools. However, the growth in demand for health occupation preparation has not gone unnoticed by four-year institutions. As a result, there has been movement among four-year, two-year, and technical institutions to develop programs of the same nature, in some cases offering the student the same program discipline at three distinct academic levels. A natural outcome of this competitiveness has been student confusion and duplication of resources. . . 196/

as well as lack of standardization and the failure to determine core curriculum requirements because of the lack of linkages between various educational programs:

> If a student were to initially attend and complete a Certified Laboratory Assistant (CLA) program in a vocational school, work for a period of time, and then decide to return to school to prepare for an advanced position such as a Medical Laboratory Technican (MLT), he would find great difficulty in having all of the previously attained credit at the vocational school accepted towards the community college degree. This becomes tragic when it is discovered that many of the tasks performed by the CLA and MLT are identical. The career ladder concept becomes an issue in the allied health area as more entry level programs are made available in traditional educational institutions. Nursing has now found itself in this dilemma with four basic entry level tracts (sic) and little articulation between them. 197/

195/ Charles Brecher, Upgrading Blue Collar and Service Workers. Baltimore: Johns Hopkins University Press, 1972.

196/ Connelly, The Role of Vocational Education in the Preparation of Health Manpower, op. cit., p. 2.

197/ Ibid., p. 13.

Given these interlocking pressures, it is of some interest to determine which health occupations remain in the category we have called "low-skill service workers with training of less than three months, given entirely on the job." In such large urban centers as New York City only one occupational category at the present time seems to fit this description: nursing aides, orderlies and attendants (Census No. 925). Only these jobs are open to those who are physically capable and have basic literacy but possess no formal pre-employment training.

Parallel to this increase in credentialling in the health occupations has been an improvement in wages, benefits and working conditions--largely financed by third-party payments--so substantial as to move the bulk of health jobs out of the secondary labor market characterized by low-pay, poor working conditions and high turnover. 198/ For women and minorities who, in cities like New York, hold the largest number of health jobs, the health industry offered a way out of the conditions associated with discrimination. The major threat to this trend until "cost containment" became the rallying cry of the industry, was the increase in credentialling which closed the entry-level door formerly open to these population groups.

The occupations considered to this point are those usually practiced in an institutional setting. The increasing emphasis, however, on home care, where possible, as a less costly, less traumatic and more appropriate modality of care than institutional care for the chronically ill, the disabled and the elderly, requires some discussion of the occupations involved in the provision of such care. 199/

The term "home care" encompasses both home health care, usually rendered by supervised home health aides to post-hospitalized patients and those whose illness can be treated at home, and home "maintenance" care for the non-restorative type of patient such as the terminally ill, the disabled and the "frail" elderly. In the case of the latter group, housekeepers and home attendants (sometimes distinguished on the basis of the degree of responsibility they enjoy) perform "chore" services of the personal care type--bathing, dressing, feeding--and the home service type--cleaning, shopping, etc. Voluntary agencies may provide non-medical support services such as transport to a health-care facility when necessary, friendly visiting, "meals on wheels" and telephone reassurance.

These health and health-related services may seem to form a logical continuum of services responsive to needs ranging from the traumatic to the chronic. In practice, however, the dictates of funding policy have

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198/ Rashi Fein and Christine Bishop, Employment Impacts of Health Policy Developments. National Commission for Manpower Policy. Special Report No. 11, October 1976.

199/ "Report of Arden House Institute on Continuity of Long Term Care, December 18-20, 1977." New York: State Communities Aid Association.

made for a fragmented non-system with type of service delivery and populations to be served determined mainly by third-party payer reimbursement policies.

Medicare, which is largely restricted to those 65 years of age and over, makes available part-time home health care either in carefully defined non-hospital situations or to post-hospitalized persons. Custodial or maintenance services are excluded, with care limited to the services of skilled nurses, therapists and home health aides. Participating home health agencies are the licensed vendors and provide these services.

Medicaid provides home health services to both the categorically and medically needy under restrictions virtually identical with those imposed by Medicare. Personal or custodial care service may however be provided on an optional basis to homebound Medicaid recipients and is in fact provided by seven states. Such care must be prescribed by a physician and may be rendered only by a non-family member, under the supervision of a registered nurse.

A significant problem is posed by the increasing number of elderly who can live at home if non-medical support services are provided, but who are marginally above Medicaid-defined levels of eligibility. To deal with this situation, proposals have been advanced that the breach between the social services model of care provided by a network of community and voluntary agencies and the medical model of care be narrowed and that there be greater use of federal funding for home care through broadened provisions under Title XVIII (Medicare) and Title XIX (Medicaid), and further, that these be pooled with Title XX (social services funds for the elderly) and Title II and VII of the Older Americans Act (relating to services and nutrition).

The occupation obviously affected by the development of such programs is that of home attendant. Because of the personal nature of the services provided, local training of workers as well as local supervision are probably both indicated; present lack of standards for training and supervising personal care providers offer a large potential for abuse. A recognized set of duties whose performance could be monitored objectively could lead to an accepted job title which some of the presently unemployed could readily fill after training of short-term duration.

In New York City, the Lombardi Act became operational on April 16, 1979. "Medicaid-eligible" persons ordinarily entitled to nursing home care can, if recommended by their physicians, receive home attendant services, visiting nurse services, etc. The cost of this care must not however, exceed 75 percent of the cost of institutional care.

APPENDIX E-2

APPAREL MANUFACTURING OCCUPATIONS

Two questions have been a periodic source of controversy among union leaders, employers and minority groups in the apparel industry: which occupations need training and under what conditions should the training be offered. Such questions can be better understood within the context of the economic and occupational structure of the industry, especially since the latter is marked by a decidedly "flat" profile with a large base of unskilled and semi-skilled workers, relatively few skilled workers and little possibility of internal advancement.

EMPLOYMENT TRENDS IN THE INDUSTRY

The declining importance of manufacturing employment in the U.S. since World War II is summarized in Table 14.

Table 14. Employment in Total Nonagricultural, Manufactures and Apparel Sectors, 1950-1978

(000)

Year	Nonagricultural (1)	Manufacttures (2)	2/1 (%)	Apparel (3)	3/2 (%)	3/1 (%)
1950	45,222	15,241	33.7	1,202	7.9	2.7
1960	54,234	16,796	31.0	1,233	7.3	2.3
1969	70,284	20,167	28.7	1,409	7.0	2.0
1970	70,616	19,396	27.5	1,372	7.1	1.9
1978	84,852	20,049	23.6	1,294	6.5	1.5

Source: U.S. Bureau of Labor Statistics, Employment and Earnings, 1909-71, Bulletin 1318-8; Employment and Earnings, May 1978, Vol. 25, No. 5.

While the total number of employees on nonagricultural payrolls increased by 88 percent between 1950 and 1978 (March), the increase in manufacturing employment of 32 percent was little more than one-third as much; the increase in employment in the apparel industry of 7.2 percent was in turn not even one-quarter as large as this modest increase in the manufacturing sector of which it is a part. In fact, employment in the American apparel industry was at a maximum in 1969 when over 1.4 million persons were employed and the industry unemployment rate was less than 6 percent. The unemployment rate soared to 14.5 percent in 1975 and, in spite of general national recovery, was still 11 percent in March 1977. Unemployment in the apparel industry exceeded the average in all manufacturing industries and the persistent decline in employment, production, profits and investment supported the claims of the industry and the unions alike that this was indeed a "distressed" industry. Import competition, in some cases supported by American

foreign investment, from the Far East, Latin America, Eastern Europe and other "cheap labor" areas was identified as the pervasive national problem. This competition compounded such regional problems as the erosion of the locational advantages of the industry in older urban centers like New York City and Philadelphia. The unusually high degree of labor intensity in the apparel industry--86 percent are production workers compared with 71 percent in all manufactures--makes it particularly vulnerable to competition from areas where hourly wage rates are not only low, but fringe benefits, which in the American industry may add as much as 25 percent to the total wage bill, are virtually non-existent.

The ILGWU estimates that in the decade 1966 to 1976, imports caused a job loss of about 225,000 jobs in the women's and children's apparel sector. Import penetration rose from 7.8 percent of domestic production in 1966, to 17.3 percent in 1970, to 31.1 percent in 1976. "Item 807" competition has been a source of further concern. Item 807 of the United States Tariff Schedule allows a domestic producer to cut the fabric pieces of a garment and ship them to another country to be finished. When the completed garment is returned to the United States, duty is paid only on the value added, i.e., the labor input, which costs sufficiently less than domestic labor to effect net savings. In 1965, Item 807 apparel imports constituted 0.3 percent of all U.S. imports; by 1975 this figure had risen to 10.2 percent. Under the Trade Act of 1974 adjustment assistance is made available to industries suffering from import competition, with the Department of Labor responsible for certifying workers' eligibility to apply for benefits. 200/ As of March 1977, apparel workers constituted the second largest product group certified for adjustment assistance. While the doctrine of comparative advantage views import competition as a long-run source of benefits rather than costs, the continuing contraction of employment opportunities for relatively low-skilled workers causes reasonable "short-run" concern in an economy grappling with overall high unemployment rates.

INDUSTRY STRUCTURE

National Distribution. Of the 1,294,000 persons employed in the industry in March 1978, more than two out of every five worked on women's, misses' and children's wear, somewhat fewer than that number produced men's and boys' suits, coats and furnishing, while the balance, about one in five, was distributed among miscellaneous fabricated textile products (15 percent), fur goods (5 percent) and hats, caps and millinery (1 percent). 201/ With the post-war dispersion of the industry

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200/ Certification confers the following benefits: weekly trade readjustment allowances (TRA); employment services, including training and related services with training allowances paid; job search and relocation allowances. All of these are in addition to unemployment insurance benefits.

201/ Employment and Earnings, May 1978, p. 54.

from New York City, a fairly stable national pattern has emerged. 202/ The fur industry 203/ remains New York-centered as do the high-fashion and moderate-price women's apparel lines. The South and West produce lower-price lines, sports clothes and "work clothing" (men and women's). The fact that half of all workers on women's dresses and three out of five of those working on women's coats and suits are employed by New York City firms confirms the continuing dominance of that city in these areas. Lagging far behind are the Newark-Jersey City SMSA (15 percent), the Los Angeles-Long Beach area (9 percent) and the Miami SMSA (7 percent). The garment industry in turn, despite the continous decline in its employment rolls, which in 1975 were a mere 42 percent of 1950 levels, still dominates New York's manufacturing sector.

The distribution of the men's garment industry reveals far less concentration in New York City. The Middle Atlantic region which includes New York, New Jersey and Pennsylvania employs almost a third of the national workforce producing men's and boy's suits and coats; the Philadelphia SMSA employment rolls are somewhat smaller than New York's. The six states of the Southeast Region together employ somewhat less than 18 percent of all workers in the industry. This same region, however, employs 60 percent of all shirtmakers, almost half of the workforce producing separate trousers and, together with the Border States and the Southwest, more than three out of four nonsupervisory workers producing work clothing.

TYPE AND SIZE OF ENTERPRISE

Generally, three types of firms or shops are found in the industry, the regular or "inside" shop which owns the materials and performs all the processes necessary to manufacture the finished garment; contract shops which finish materials owned and sometimes pre-cut by others; and jobbing shops which may cut or finish materials but contract out many of the manufacturing operations.

202/ U.S. Bureau of Labor Statistics, Industry Wage Surveys: Women's and Misses' Dresses, August 1971, Bulletin 1783, 1973; Women's and Misses' Coats and Suits, August 1970, Bulletin 1728, 1972; Men's and Boys' Shirts (Except Work Shirts) and Nightwear, October 1971, Bulletin 1794, 1973; Men's and Boy's Separate Trousers, January 1971, Bulletin 1752, 1972; Men's and Boy's Suits and Coats, April 1973, Bulletin 1843, 1975; and April 1976, Bulletin 1962, 1977; Wages and Demographic Characteristics in the Work Clothing Manufacturing Industry, March 1972, Bulletin 1858, 1975.

203/ New York's role as host to a recently initiated international fur fair is expected to have contradictory results, lessening seasonal slumps but putting pressure upon the limited supply of skilled workers.

The relatively simple technology of the industry is associated with high labor but low capital intensity and ease of entry and exit of firms. With some notable exceptions, the average size of the 25,000 firms in the industry tends to be small, with fewer than 60 employees in each; in the women's apparel industry the average is closer to 50. About 80 percent of all employees in New York City and Paterson work in such small shops, as do about 60 percent in Los Angeles. In the St. Louis area, however, four out of five are employed in shops with 100 workers as are three out of five in Dallas, Fall River and New Bedford. Only one in five worked in such large shops in Boston, Miami, Newark, Jersey City and Philadelphia and only one in twenty in the New York area. Expensive dresses are prduced in the smaller shops of New York with their highly skilled workers and rapid responsiveness to fashion changes while cheaper, more standardized items are produced in larger plants located outside of New York in areas where they have access to less skilled and less costly labor. An exception is Jonathan Logan, Inc., located in New Jersey, which with thousands of workers on its payroll, is the largest dress producer in the industry.

Men's garments, including shirts and work clothes, tend, like women's cheaper lines, to be produced in large plants. Except for the top of the line, these are more standardized items for which less skilled and less expensive workers can be used. Levi Strauss of San Francisco employs about 25,000 workers, Hart, Schaffner and Marx headquarters in Chicago about 20,000, and Phillips-Van Heusen, the shirtmakers, about 15,000. Thus, while nationally, one in three of all workers employed in the production of men's and boy's suits and coats worked in plants with at least 500 workers, the figures for the Great Lakes region and the southeast were considerably higher. 204/

OCCUPATIONAL STRUCTURE

There are about a half-dozen basic occupational groups in the apparel industry although individual divisions, such as men's suits and coats, require an extraordinarily large number of operations (150 to make a suit, more than 75 for a coat). In successive steps, the initial design is translated into a pattern and then a sample by the pattern-maker and sample-maker; production begins when the material is spread, the garment parts marked and cut and then prepared for sewing by fitters. Sewers and stitchers, both hand and machine, complete the garment, which is periodically pressed and inspected and subjected to a variety of finishing operations including thread trimming. The basic industry-specific occupations which reflect these operations are Designer (183); Pattern-maker (183); Sample-maker and Spreader, marker and cutter (612); Sewer and stitcher (663); Presser (611) and various finishers. Pattern-makers and cutters are the most skilled of the production occupations; it is their skill which determines the shape and the fit of the garment as well as the most efficient use of the material.

204/ U.S. Bureau of Labor Statistics, Men's and Boy's Suits and Coats, April 1976, op. cit.

While the sewing machine remains the basic equipment in the industry, some technical improvements have been introduced in recent years. Changes in machine production techniques have diminished the amount of hand sewing even in high-priced garments, and a numerically controlled sewing machine has been introduced into the production of men's shirts. Computerized pattern grading has been introduced into the cutting process; electric or laser-powered cutting machinery permits the cutting of as many as 60 garments at one time in contrast to the five or six that result from hand-held shears (the former is still restricted to lower-priced garments since pieces may shift, making the cut less accurate). Improvements in sewing-room technology include needle positioners, fabric fusing processes and other changes affecting repetitive processes. These changes have not, however, reduced the very high labor intensity of the industry previously mentioned.

The sex distribution maong occupations is similar in both male and female garment production. In both, sewing machine operators and hand sewers constitute at least half of all production workers and are largely female, as are inspectors and finishers. Pattern-makers, cutters, markers, pressers and tailors, on the other hand, are usually male; since these jobs are more skilled, these workers receive higher wage rates and yearly earnings than the operators. Interoccupational mobility is limited, and there are few career ladders in place.

MODE OF PRODUCTION, METHODS OF PAYMENT AND WAGE RATES

The quality of the finished garment dictates the type of production method used, which in turn determines both the method of payment and the level of the wage rate. The higher the grade of the garment, the fewer the number of machine operations and the greater the use of skilled workers ("sewing-machine operators, singlehand /tailor/ system") who can perform all the operations necessary to turn out the finished product. Style changes are so frequent in such apparel as to make this type of operation profitable. Such workers are usually paid straight-time rates. In contrast, on cheaper lines "sewing-machine operators, section (bundle) system," are used in the repetitive production of the same part (sleeves, pockets); these are usually paid on a piecework or incentive basis with a predetermined rate paid for each unit of output.

Apparel workers as a whole earn about one-third less per hour than the average worker in manufacturing--$3.60 versus $5.48 in March 1977, and also worked on average 4.6 fewer hours per week. The combination of these two factors made for average weekly earnings in that period of $127.80 compared with $219.75 for all manufacturing workers. 205/ These figures, of course, suppress considerable geographic and product dispersion. Skilled workers in the men's garment industry earn more than

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205/ Employment and Earnings, May 1977.

in the women's, singlehand operators more than section, and overall, men, because they hold the more skilled jobs, earn more than women. Seasonality and high turnover are other factors determining yearly earnings.

CHARACTERISTICS OF THE LABOR FORCE

Because of the numerical dominance of the sewing-machine operators, the labor force of the apparel industry is primarily female. It is furthermore largely minority, immigrant, non-English speaking in many areas, heavily populated by secondary workers and distinctly "one-generational."

Drawn before World War I from the "old world" and since World War II from poor native whites and the Puerto Ricans, Dominicans, Haitians, Mexicans, Cubans, and Chinese 206/ of the "third world"--all societies where home sewing is a customary activity which provides informal pre-employment training--the industry has traditionally been a stepping stone, if not for the workers, for their children. While "sewing English" is all that is required, location of factories in ethnic enclaves assures a steady flow of workers whose English has not yet advanced to even that limited stage. Opportunities are also created obviously for evasion of minimum wage laws, safety regulations and other types of worker protection.

TRAINING

In recent years, a problem second only to imports has risen to plague the industry, that of labor shortages. There is a dwindling supply of Chicanos in Los Angeles, of Cuban exiles in Miami, and of Puerto Ricans and other Hispanic garment workers in New York City, all traditional members of the industry's labor force. This development has been attributed to a number of factors: the negative image of the industry as one characterized by low wages and seasonality, the competition of welfare with low-wage employment, the "easy" availability of unemployment insurance benefits, the failure to tap the potential supply of mature women with home sewing experience and, finally, the failure to expand training. Equally in short supply are the better-paid skilled workers in the New York fur industry. Greek, and other immigrants are essential to the viability of the industry since the vocational education programs do not turn out sufficient numbers of skilled workers.

206/ The garment industry has become the largest single employer in New York's Chinatown. See "New York's Chinese Man Apparel Factories Much Like Sweatshops," Wall Street Journal, May 31, 1978, p. 1.

Industry-supplied training generally consists of informal, on-the-job training, whether for sewing machine operators or cutters and pattern-makers. The latter start as helpers and learn by doing; given a certain degree of aptitude. With the inception of the Manpower Development and Training Act (MDTA) in 1962, there surfaced the enduring controversy between union leaders on the one hand and employers and representatives of black groups on the other, as to the advisability of substituting government-subsidized training for such industry efforts. The usual focus of concern has been training for sewing-machine operators. Operators can be trained in a matter of days; a combination of aptitude and experience gives the necessary speed to permit the worker to "make the rate," except for those who lack sufficient manual coordination.

Union spokesmen view extended training for this occupation as a way of providing cheap labor to employers and giving the non-unionized firms further cost advantages. 207/ Employers and black groups support such training, although for different reasons. The union view has prevailed, however, and the apparel industry has been systematically excluded from federal training programs: since 1966 from MDTA monies, from the Community Action Program in Newark, which was largely financed by EOA funds, from the JOBS program in Philadelphia, and at present, from most CETA funds. Only the Opportunities Industrialization Centers (OIC) in Philadelphia succeeded in using federal funds to train power sewing-machine operators; unfortunately, failure to use modern equipment led to unsatisfactory results in skill acquisition. 208/ At present writing, CETA Title III monies are being made available on a limited basis to train disadvantaged workers for skilled and semi-skilled jobs in the men's and boy's tailored clothing industry through various type of on-the-job training, but it is too early to assess the effectiveness of this program. 209/

Like other employers, apparel manufactures would prefer to recruit experienced workers than to train their own, especially if they are small. Using supervisors to train workers is viewed as costly in busy periods and as unnecessary in slack periods. Only employer organizations working together with the unions can provide a rational solution to the problem of training not only sewing-machine operators but replacements for the aging skilled workers in the industry. Some of the larger companies, particularly those in the men's and boys' suits and coats part of the industry which requires the most skill, have provided formal

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207/ See "Interim Report of the (Mayor's) Task Force on the Apparel Industry," November 13, 1978.

208/ Elaine G. Wrong, The Negro in the Apparel Industry, Report No. 31, The Racial Policies of American Industry. Philadelphia: University of Pennsylvania, 1974, pp. 108-115.

209/ JTR, Inc. of Cambridge, Mass. is directing and monitoring the program.

training. Examples were Joseph M. Cohen in Philadelphia, Botany (Mitchell Daroff) which had trained cutters, Hart, Schaffner and Marx in Chicago, and in the work clothes sector, Levi Strauss in San Francisco. 210/

210/ In New York City, formal training is provided by the High School of the Fashion Industries and the Fashion Institute of Technology, a junior college. Both receive mixed reports as a source of trained labor for the industry. See Sally T. Hillsman, Entry Into the Labor Market: The Preparation and Job Placement of Negro and White Vocational High School Graduates. New York: Bureau of Applied Social Research, Columbia University, 1970 and Brecher, op. cit.

APPENDIX E-3

METALWORKING AND MACHINE TRADE OCCUPATIONS

The metalworking occupations are distributed among four major industry groups: Fabricated Metal Products (SIC 34); Machinery, except Electric (SIC 35); Electrical Machinery (SIC 36) and Transportation Equipment (SIC 37). Among them, these four industry groups provided employment to about seven million workers in 1975. 211/

According to a joint BLS-ETA survey of industry training practices, 212/ somewhat fewer than one in five were employed in 14 "highly skilled manual occupations": crane, derrick and hoist operators (also known as "operating engineers"); electricians; electroplaters, filers, grinders, buffers, etc.; layout worker, metal; machine tool setters; machinists; mechanics, maintenance; millwrights; patternmakers, metal/wood; plumbers and/or pipefitters; sheet-metal workers; tool and die makers, metal; welders and flamecutters. Few of these occupational titles are unique to the metalworking industries. Plumbers, electricians, and crane, derrick and hoist operators are found in the construction industry; millwrights, who move and install machinery and maintenance mechanics are found in many manufacturing industries; welding is a widely used skill in a large number of industries.

Although the phrase "highly skilled" is used, this group reflects no uniform skill level but rather, a range of skills and required training times with tool and die makers, lay-out men and maintenance mechanics at the upper end, and welders and cranemen at the lower. Over 10 percent of all employees in these 14 occupations were enrolled in structured training programs, with machinists and welders each accounting for one-quarter of such trainees. Seven percent received some form of structured qualifying training, largely on-the-job, with registered apprenticeship programs accounting for almost half of the total enrollments in these programs. 213/ The comparative figures for apprenticeship reflect the relative importance attached to high-level, well-rounded training in the various crafts. Between 70 and 90 percent of all trainees among tool and die makers, plumbers, electricians and millwrights were in registered apprenticeship programs, with two occupations, tool and die maker and machinist, accounting for almost one-half these slots.

211/ Employment and Earnings, January 1977.

212/ U.S. Department of Labor, Occupational Training in Selected Metalworking Industries, 1974, op. cit.

213/ Qualifying training given the newly hired is distinguished from skill improvement training intended for promotion; structured training (apprenticeship, classroom training, combined work-experience and classroom) whether given in the form of on-the-job training (OJT) or off-production site training (OPST), from informal work experience; and job-specific training from general orientation courses.

The usual length of training time is another indicator of skill level. The four occupations that led in apprenticeship required between two and four years of training. Maintenance mechanics and pattern makers were also largely enrolled in programs lasting two years or more. In contrast, all cranemen and 70 percent or more of filers (and other metal-finishing specialties), lay-out men, set-up men, sheet-metal workers and welders were enrolled in shorter programs. 214/

The supply of training programs is largely a function of establishment size. Of the 15 percent of all establishments that made such programs available, firms with over one thousand employees supplied almost one-half the total. The major reason given by firms for providing such training was the perceived superiority of in-house programs in imparting skills, while the major reasons advanced against were satisfaction with informal methods and reliance on the recruitment of trained workers from other firms. Of less importance as reasons for not supplying training were the cost of training and the fear of losing trained workers to other firms. 215/ Of the four metalworking industries, the nonelectric machinery manufacturing industry (SIC 35) offered the largest number of training programs and over 40 percent of all workers were in plants having these. The Baltimore area led the list with 80 percent and the Hartford area was second with 70 percent. 216/ The existence of such programs in Connecticut did not, however, prevent that state from reporting a state-wide shortage of tool and die-makers, machinists and maintenance mechanics in June 1977. 217/

A better understanding of the training situation may be afforded by a brief review of the individual occupations. The annotations that follow are specific largely to the metalworking and machinery manufacturing industries; the descriptions are based in the main on material culled from the DOT, the Occupational Outlook Handbook and the occupational glossaries of the relevant Industry Wage Surveys. A careful reading of the latter yields useful clues to skill levels as well as to types of lengths of training. Job descriptions which include the phrase: "In general, the work. . .requires rounded training and experience usually acquired through a formal apprenticeship or equivalent training and experience" pertain to the high skill occupations such as Tool and Die Maker (561, 562), Machinist, maintenance or production (461, 462), Maintenance mechanic, Job and die setters (454) and Welder (680), Class A. At a somewhat lower level, reference to blueprints and drawings imply at least a medium level of skill, usually

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214/ Data obtained from unpublished tables supplied by the author of Occupational Training in Selected Metalworking Industries, 1974.

215/ U.S. Department of Labor, Occupational Training in Selected Metalworking Industries, 1974, op. cit., p. 11.

216/ U.S. Bureau of Labor Statistics, Industry Wage Survey: Machinery Manufacturing, Winter 1974-75, Bulletin 1929, 1977.

217/ Connecticut Business and Industry Association, "Unfilled Jobs in the Midst of High Unemployment," Hartford, Connecticut, 1977.

acquired on the job and exemplified by such occupations as Class A machine tool operators (including Machine-tool Operators, toolroom and the most skilled Tool Programmers, Numerical Control (172), Class A assemblers, and Class B machine-tool operators (production). Other occupations, far more numerous, are described as involving "routine and repetitive operations." These are typically semi-skilled machine operative or assembly jobs for which formal training is generally not required, as in the case of Class B and C Assemblers (602), Class B Welders and Class C Machine-Tool Operators.

TOOL AND DIE MAKERS (561, 562)

These are actually two related but separate occupations--toolmaker and diemaker--with the latter the more skilled. They produce the tools and dies which are at the basis of modern industrial mass production in all metal-working industries. The toolmakers build the jigs and fixtures which keep pieces rigid so that they can be machine-processed, as well as gages and measuring devices. Diemakers produce the dies used in cutting, stamping and shaping metals and other materials as well as the metal molds used in diecasting and in molding plastics. Both also design tools and dies and repair them when necessary.

The largest number of tool and die makers work in plants that produce automobiles, aircraft, transport equipment, tractors and other agricultural equipment and construction equipment. If they are employed by specialty shops, known as contract or job shops, which produce the final product on a contract basis for other firms, they are classified as "tool and diemakers, jobbing" in contrast to "tool and diemakers, other than jobbing" who generally work in the tool and die department of a large firm and are involved in the production of a larger final product. Finally, they may, as is the case in the automobile industry, work in a "captive shop" which turns out a specialized line for the company that owns it.

Tool and die makers are the elite of the skilled metalworking craftsmen. They must have an extensive knowledge of machine tools and of the properties of metals and must, in the course of their training, acquire a mastery of the requisite mathematics and physics, be able to read blueprints and have an extensive knowledge of machinery operations. Horowitz and Herrnstadt have identified six mutually exclusive training paths to these occupations: on-the-job training; vocational high school; picking up the trade; apprenticeship; vocational high school plus on-the-job training; vocational high school plus apprenticeship; miscellaneous. 218/ They point out that these represent a wide diversity of paths, with no one dominating; that even formal methods are marked by informality; that these trades are not acquired casually (it takes eight to ten years), and that only one path, vocational high school

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218/ Horowitz and Herrnstadt, op. cit.

combined with apprenticeship, scored high on most tests of competence. On-the-job training usually involves becoming all-around machinists first, beginning as single machine-tool operators and set-up men, going on to additional machine tools and eventually becoming tool and die makers.

MACHINISTS (461, 462)

The census occupational category "machinist" is an umbrella term that covers a number of closely related occupations with somewhat different duties and training paths. A machinist, production (also known as "all around"; custom machinist) is responsible for the fabrication of complete metal parts or machines and is required "to plan and lay out the work, shaping metal parts to close tolerances and exhibiting a knowledge of common metals and of a spectrum of materials, parts and equipment." A maintenance machinist requires the same type of broad-gauged background and training, although the work involves the production of new and replacement parts necessary to the repair of the mechanical equipment used in the shop. Overlapping the work of the production machinist is the work of the setup workers (job and die setters, metal, who prepare machines for repetitive production runs by machine operatives); as well as the work of the machine-tool operator, toolroom, the Class A machine-tool operator, and the operators of numerically controlled (N/C) machines where these require a toolroom level of skill.

Machinists, like tool and die makers, acquire their training in a number of ways. In the BLS study, one-third had skill-improvement training, two-thirds, qualifying training. Fewer than half of those in the latter category came out of apprenticeship programs. 219/ Clearly, on-the-job training and internal labor markets play a major role in the making of machinists.

If relative earnings are used as indicators of skill levels and indirectly, of the training time necessary to acquire these skills, the distinctions on this score among production machinists; maintenance machinists; machine-tool operators, toolroom; machine-tool operators, production, both Class A and numerically controlled, are hazy, indeed.

A comparison of average hourly wage rates in the major metropolitan areas of the United States shows great variation among different machinist titles. Maintenance machinists in all areas earn more than production machinists; among other specialists, the wage relatives are more complex. In three-quarters of the reporting areas, some tool-room machinists earn more than production machinists, but

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219/ U.S. Department of Labor, Occupational Training in Selected Metalworking Industries, 1974, op. cit.

this proportion declines to about one-half for other tool-room machinists and Class A operators, and to 40 percent for numerically-controlled operators. 220/

It would seem that the title of "machinist" in and of itself reveals little about the nature of the product, the degree of precision required for its production, or the level of responsibility assigned to the worker, all determinants of wage rates. Titles also do little to explain regional differences--why, for example, a machine tool operator, tool room, one machine, in Chicago, receives the highest hourly rate of any of these occupations anywhere in the country.

WELDERS (680)

Welding has largely replaced riveting as the process by which metals are joined together, a process essential to the production of airplanes, automobiles, bridges, ships, pipelines and a host of other products made of metal. Welders employed in automobile production can learn their job, which involves the use of a welding machine to do spot welding, relatively quickly; welder fitters are more skilled, requiring some mathematical background and the ability to read blueprints. Welding technicians, the kind used on major pipelines, require still more extensive background, including a knowledge of drafting, metal testing and the use of testing equipment. They can also go on to become welding supervisors who direct teams of welders. The welding engineer, finally, usually has an engineering degree and is found in the professional category.

According to the American Welding Society, welding is a rapidly growing occupation with good opportunities for women. The number of welders in 1974 totalled 645,000, more than double the estimated number in 1970. About 800 vocational schools offer pre-employment training courses which differ in quality according to the ability to replicate on-the-job situations and equipment. Welders, as noted, filled a relatively large number--one-quarter--of the structured training slots in the metal working industry in 1974, but did not figure prominently among registered apprentices.

POLISHER AND BUFFERS; POLISHING- AND BUFFING-MACHINE OPERATOR; GRINDING-MACHINE OPERATOR (621)

A metal part, once cast or forged, generally requires further finishing or machining. Some of this is achieved by the use of cutting tools, but the rest is done by polishing and grinding or abrasive machining to give greater accuracy and a high finish. Grinding and

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220/ U.S. Bureau of Labor Statistics, Industry Wage Survey: Machinery Manufacturing, Winter 1974-75, op. cit.

polishing machines, in fact, constitute about one-fourth of the dollar value of the machine tools sold annually in the United States. 221/

A relatively small number of polishers and buffers work to extremely close tolerances; these require the "rounded knowledge of the trade" that is acquired through formal apprenticeship or other extensive training and experience. Polishing- and buffing-machine operators and grinding-machine operators are at a distinctly lower level of skill and do not require the extensive experience of the first category.

ASSEMBLERS (602)

The bulk of assemblers (Class C) are relatively unskilled, performing repetitive assembling operations with no necessity to make decisions on fitting of parts. Training for this group is completely on the job. Class A assemblers, on the other hand, make decisions about the proper performance of parts and require some level of skill in the use of drawings and blueprints. Class B assemblers work under prescribed procedures and at a lower level of required skill. Both receive on-the-job training supplemented by skill improvement training.

Knowledge of local practice with respect to upgrading is important. It is hard to tell without prior inquiry whether an attempt to offer enough technical training in a night school course to qualify a Class C operator to advance to Class B would pay off. It may be that large employers already offer such training, or that the demand for Class B and Class A operators is more than fulfilled by experienced workers in the labor market. The provisions of union agreements may also be important in determining bidding arrangements and promotional sequences.

The relation between training and reported shortages of skilled workers in the machine and metal trades is a complex one. The cyclical variations in demand for both machine tools and the workers who make and use them is well-known. Students of business cycles have noted the "accelerator effect" upon capital goods demand of a relatively small change in the rate of increase or decrease in consumer demand for the finished product. Keynes in the General Theory pointed to the rapid absorption of such skilled workers as a bottleneck which would increase the inelasticity of supply long before the achievement of full employment generally.

Regardless of the training path followed, skilled tool and die makers, set-up men and the like cannot be turned out in short periods of time; the disinclination to train in periods of recession virtually assures shortages during recovery. In the case of the current reported shortage of such workers in Connecticut and the potential shortages

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221/ Leonard E. Samuels, "The Mechanisms of Abrasive Machining," Scientific American, November 1978, p. 132.

elsewhere, Ginzberg has concluded that the roots of the problem lie in the prospective retirement of large numbers of skilled workers, i.e., the bunching effect of a predominance of workers in their forties and fifties; the limited outflow from vocational schools and other training programs, including CETA; and the difficulties of recruiting able young people into such career paths. 222/

The historic answer to labor shortage in such high-technology countries as the United States has been capital substitution. At present writing, for example, the National Machine Tools Builders Association reports a surge in new orders for machine tools, the largest since the recessionary period of 1974. 223/ The automobile industry's plans to build lighter cars in the 1980's, converging with demand from the aerospace industry and other sectors, has resulted in a time lag from order to shipment of about one year. The desire for independence from such pressures has led automotive companies to place large orders for "transfer lines." These are a complex of machines coordinated by computer-controlled machining centers which can create finished parts with a minimum of labor. Such technology, however, is very costly and its use is presently restricted to large companies, the very ones who normally do the bulk of the training for the skilled occupations. It is as yet too early to predict what the tradeoff between these two trends, labor substitution and labor training, will be and how the supply and demand of trained workers will be affected as a consequence. 224/

222/ Eli Ginzberg, "Does the United States Face A Shortage of Skilled Workers?" in Good Jobs, Bad Jobs, No Jobs. Cambridge, Mass.: Harvard University Press, 1979.

223/ "Toolmakers Are Getting Big Orders," The New York Times, May 29, 1978, p. D-1.

224/ The National Center for Productivity and Quality of Working Life has provided a summary review of training efforts in both the conventional and nonconventional technologies of metalworking and machining. See A. Harvey Belitsky, New Technologies and Training in Metalworking. Washington: Government Printing Office, Summer 1978.

APPENDIX E-4

COMPUTER OR ELECTRONIC DATA PROCESSING (EDP) OCCUPATIONS*

Electronic data processing (EDP), or information processing by computers, has been a high-growth industry for the last quarter of a century, with a rate of technical advance so rapid as to spawn new "generations" of computers every five to ten years and a pervasiveness that has made the computer terminal a standard piece of office equipment. A description of the structure of the industry is provided by the American Federation of Information Processing Societies, Inc.:

> The two essential ingredients in electronic data processing (EDP) are: 1) the computer and computer-related equipment, known as "hardware," and 2) the assembled instructions, or "software" [programs written in machine language], which enable the computer system to perform its tasks.
>
> In its simplest terms, a computer installation consists of 1) a system of devices for the input of data and information into the system; 2) a "memory" section used to store data, information, and "instructions"; 3) a central processing unit where the data and information is processed, or acted upon, in accordance with the stored instructions; and 4) output devices which make the processed information or "answers" available to us. 225/

It is convenient to group computer occupations according to their relationship to the hardware or shoftware aspects of the industry, or as can happen, to somewhere in-between. As the fourth edition of the DOT testifies, there has been a proliferation of job titles, but a simplified version of the categories used in the Weber Salary Survey on Data Processing Positions, offers adequate coverage for our purposes. 226/

225/ American Federation of Information Processing Societies, Inc., jointly with Council of Better Business Bureaus, Inc., "Facts on Consumer Careers," Publication No. 03-232, 1973, p. 4.

226/ Michael Cashman, "DP Salary Survey," Datamation, November 1977, p. 114.

*We are indebted to Walter A. DeLegal for comments on this section.

Engineers, applied mathematicians and scientists design and develop new techniques, materials and equipment for the production and improvement of computers and related equipment. With few exceptions, the required training is at the professional level.

Maintenance, customer service or field engineers install, service and maintain the physical equipment. Increasingly, a knowledge of the software used by the customer is essential to the proper servicing of the hardware; this mixed terrain of hard- and software has come to be known as "firmware." An entry-level trainee is expected to have some familiarity with test equipment, a foundation in electronics and solid state physics and the ability to read electrical drawings. Such a background can be acquired through two years of technical school training, or by training in the military, or by a combination of schooling (including vocational high school) and "hands-on" experience. General "electronics" training, where this involves electro-mechanical products such as typewriters, or such electronics as is required in stereo and TV repairs is not relevant to this occupation and advertisements to the contrary are generally misleading. Since the basic requirements are the same, movement between production and repair sectors is always possible. Vertical movement from simple to more complex product groups is also a characteristic of this occupation.

Rapid technical changes require constant retraining, almost always provided at company expense. Technical expertise alone is not sufficient where customer relations are of obvious importance. Initial screening for "positive" personality traits is usually followed by specific training in customer relations.

Computer or console operators, under the supervision of the programmers, help to determine the equipment necessary to execute the computer programs. Under the lead and senior operators are, in descending order of experience and responsibility, operators A, B and C. The C level operators comes closest to being a trainee although, even at this strictly delimited level, some previous exposure to computer operations is usually sought. This occupation, while at a distinctly lower skill level than those described above, generally requires on-the-job training because of the necessity of access to sophisticated equipment. Work-study programs come closest to providing acceptable, if low-level, pre-employment training. Once on the job, an internal career ladder is in place; six months to one year of experience can lead to an operator A level job and with corresponding increases in experience, still higher levels are attainable. The work is physically onerous and is frequently scheduled at off-hours to provide continuous operations.

Data control and data entry are other aspects of DP operations with job hierarchies reflecting increasing levels of responsibility. Data control clerk trainees and data entry operators (keypunch) trainees are at the lowest skill levels, but have different entry routes and different promotional paths.

In-house training is the mode for data control clerk trainees. No job-specific pre-employment training is required, but almost any type of computer operations background, including school courses, is helpful to entry. In contrast, on-the-job training is not the norm for keypunch operators. Typing ability--seemingly the most portable of the acquired skills--is, however, as readily accepted as pre-employment keypunch training without paid work experience as a credential for the job and, if a good rate of speed is demonstrated, even more so. /As an aside, it may be noted that in some respects key punch operation shares some traits with sewing-machine and other production operations. The essential specific training is brief; experience alone brings the operator "up to the rate"; there are operators who lack the level of hand-to-eye coordination required to achieve the necessary combination of speed and accuracy for top-paying and stable employment./

With experience, key punch operators can move vertically to supervisory roles, but lateral movement to other divisions of the industry is not usual. Such lateral movement is, however, more likely among control clerks who may move on to become computer operators, technical support specialists and in some cases, programmer trainees.

Auxiliary or peripheral equipment operators. This category includes tape handlers, tape librarians, assemblers, compilers, printers and the like. Short-term pre-employment training can help in entry but is not strictly required if the right personal attributes or any roughly equivalent production experience are present.

SOFTWARE

Programmers. Using a suitable machine language, programmers write the organized instructions which enable the computer to process the information input and to solve the problems presented to it. They may specialize in business applications, scientific applications, or systems programming which, in contrast to the two types of applications programming, deals with overall problems of computer use, the setting of priorities for the use of computer time and the like.

There are multiple hiring paths and, in practice, a general equivalency scale exists among: 1) the high school diploma plus four years paid experience; 2) the general AA degree plus two years of paid experience; 3) the AA or BA degree with a two-year concentration in programming; and 4) the BA degree plus one year paid experience. The junior programmer or programmer trainee can emerge from a junior/or senior college without paid experience, or from high-quality vocational schools, public or private, which generally "cream" the applicant pool and have positive links with employers, or, finally, from an in-house pool (keeping in mind that there is little crossover from hard to software). The usual procedure followed is to use the IBM Programmers Aptitude Test and to screen for evidence of logical quality of mind and other essential attributes. The creativity that characterizes the superior programmer is generally not readily testable and can only become apparent in actual work situations.

Systems analyst. This professional analyzes the whole system of information flow from the source through the computer and is in some respects a "super-programmer" with an intimate knowledge of all phases of computer operations. Only a handful of unique individuals in this occupations are without BAs or more advanced degrees.

There are few industries where the pressures of technical change have created more continuing need for lifetime training and retraining. The growth of independent software suppliers and of the industry in general, as well as its "glamour" image, have been conducive, however, to exaggerated claims as to the ease of entry into "good" jobs such as programming, once pre-employment training is completed. The evolution of software "packaging" has decreased the demand for lower level programmers capable of only routine programming operations, while the increased demand for high-level programmers can only be met by a combination of increasingly sophisticated training and work experience.

One analysis which foresees explosive industry growth as the norm ("Help Wanted: Burgeoning Computer Software Industry Foresees Fivefold Increase in Jobs by 1985) concentrated on the role of training: 227/

> Training seems to be at the root of the problem. Training breadth and quality are insufficient to meet market needs. General programmers of two years experience remain most in demand, though most companies don't want to do training. They may lack time or money for it, and once they do train someone, there is no guarantee that the employee won't scoot over to another firm.
>
> IBM, which does a lot of training of computer specialists, says it isn't having any particular trouble tracking down programmers for its "limited openings." . . .the company's willingness and ability to train have kept IBM above the labor shortage problem.
>
> . . .Furthermore, technological changes are occuring in the industry at a much more rapid pace than curriculum changes in computer schools. Thus many school graduates aren't overly marketable. . .Ultimately, the software industry will. . .recognize that part of the answer to its labor shortage will have to be increased training by companies themselves.

The existence of a shortage of EDP personnel does not receive complete confirmation from the usual indicators. While the first stage of an increase in demand has been demonstrated, in the sense that at the same wage, more workers are demanded, the second stage,

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227/ The Wall Street Journal, May 12, 1977, p. 40.

an increase in the (real) wage offered for these workers, has not. According to the 1977 DP Salary Survey referred to earlier,

> Managing lots of people or punching lots of cards were the only two activities data processing personnel engaged in during 1977 that allowed them to at least stay abreast of a 6.9% inflation rate. . .
>
> The best explanation of how lower grade personnel have managed to keep pace with inflation is that they often are represented by a union and receive stock cost-of-living escalators. Still, one wonders why a data entry operator trainee is worth a whopping 15% more in salary over last year, and why a combined systems and programming trainee can expect to get about 1.2% less than last year.

Finally, increasing the supply by increasing the availability of training programs in-house, is still, as the evidence quoted above indicates, in the thinking stage. It remains a truism that in EDP, as elsewhere, firms would rather recruit than train, unless the costs of not doing so are perceived to be dangerously high.

APPENDIX E-5

CONSTRUCTION OCCUPATIONS

The occupations discussed here are the major census groups in construction, but other industries employe significant numbers of workers in these classifications, especially carpenters, electricians, glaziers and crane operators.

As a method of training, apprenticeship is more important in construction than in any other branch of industry, but only a minority of craftsmen in most trades have ever been formally apprentices. While registered apprenticeship programs may be established in nonunion settings, most of them are, in fact, the result of labor-management agreements. The scope of apprenticeship is limited by the fact that residential construction, which accounted for about 40 percent of total dollar activity in 1977, is nonunion. Furthermore, nonunion contractors have been making inroads in the contract sector of the industry, as a result of the prolonged slack in building during the seventies and the relatively stronger growth in the traditionally unorganized Southern and Southwestern parts of the country.

Mills (1972) who has analyzed the place of apprenticeship and other training routes in the construction industry, describes apprenticeship as a training mechanism rather than as a chief source of labor supply. 228/ That is, to say, apprenticeship accounts for only a small proportion of entry into the trades, but it does produce fully-rounded craft workers. These, in turn, are necessary for craft administration of the work. In contrast to bureaucratic administration, a highly-trained craftsman can supervise himself, thus obviating the need for decentralized planning of work and its supervision. Perhaps because apprenticeship has never been the major entry route, there are signs that bureaucratic methods are on the increase. In particular, nonunion employers have begun to offer intensive classroom training of shorter duration as an alternative to apprenticeship training when the immediate supply of craft workers is inadequate for their purposes.

It should be kept in mind that occupational content varies greatly among the trades. In bricklaying, painting and roofing, skill is largely the ability to perform a difficult physical task at an acceptable pace. In carpentry and the pipe trades, it is knowing several specialties that make up the trade and having the capacity to lay out and perform a job. For operating engineers, it is manipulative skill that counts--the ability to operate large machines safely and efficiently.

If apprenticeship is not the major entry route, how are skills acquired? Vocational schools cannot offer adequate training in the

228/ Daniel Q. Mills, Industrial Relations and Manpower in Construction. Cambridge, Mass.: The MIT Press, 1972.

apprenticeable trades because of the importance of on-site conditions that require long periods of on-the-job training or experience. Vocational courses may be useful in preparing for apprenticeship, but the typical articulation between the two is poor. Vocational schools do play a role in providing facilities for the related classroom training that forms part of apprenticeship programs.

While skills are picked up in a variety of ways, including military service and summer work, the most common way is through trial and error, and only soemwhat more formally, as a helper. Some trades have institutionalized informal mechanisms. Thus, in asbestos and insulation work, there is a modified apprentice program called "improvership." Operating engineers have a few apprenticeship programs, but entry is more often through the category "oiler" (helper). Ironworker union locals have a system of "permitmen," workers who may be hired when demand is temporarily greater than the supply of regular craftsmen. Such temporary arrangements are probably more common in one of the ironworker subspecialties, reinforcing, i.e., setting steel rods in concrete forms, which is not a highly skilled task.

The largest group of construction workers consists of laborers whose on-the-job training is minimal. They constitute a highly flexible, seasonal workforce, many of whose members are only marginally attached to the industry.

The list that follows shows the estimates provided by the Bureau of Labor Statistics (Bulletin 1918) of the proportion of entry workers provided by apprenticeship. The listed occupations differ in several ways. First, not all of them require two or more years of training, even though some of the lesser-skilled have apprenticeship programs longer than two years. Second, the estimates for proportions of openings supplied through apprenticeship include workers who are employed in industries other than construction. Third, the estimates are exceedingly rough. As an example of unavailable data, we do not know how many craftsmen are legal immigrants. Having a trade is an aid to immigration, and for those occupations where licensing is not an issue (as it can be for plumbers and electricians), immigrants form a supply of ready-made workers.

Since 1972 the Department of Labor has financed through the Recruitment and Training Program (RTP) two programs for the training of several thousand disadvantaged people, mostly minorities, veterans and women, for construction (and industrial) occupations. The first, a pre-apprenticeship training program, consists of ten weeks of intensive tutoring to pass the apprenticeship examination in a specific craft (carpenter and electrician have been the two most popular choices). The second program, journeyman upgrading, is intended for a much smaller number of already skilled craftsmen who receive construction jobs and union membership upon the completion of the program.

Table 15. Apprenticeship in the Building Trades

Census Group		Apprenticeship Completions as Percent of Annual Average Job Openings, 1974-85 a/
	Two Years or More of Required Training	
410	Brickmasons and Stonemasons)	50
560	Tile Setters)	
415	Carpenters	15
420	Carpet Installers (training data includes resilient floor covering workers classified as tile setters in Census)	15
430	Electricians	60
445	Glaziers	50
510	Painters, Construction and Maintenance)	
512	Paperhangers	10
520	Plasterers	50
522	Plumbers and Pipe Fitters	25
534	Roofers and Slaters	10
550	Structural Metal Craftsmen	30
	Less Than Two Years Training Required	
601	Asbestos and Insulation Workers	10
421	Cement and Concrete Finishers (Masons)	15
615	Dry Wall Installers and Lathers (Installers begin as helpers Lathers)	35
440	Floor Layers (Wood - includes finishers)	—
412	Bulldozer Operators)	
424	Cranemen, Derrickmen and Hoistmen)	
436	Excavating, Grading and Road Machine Ops.) Collectively, these are known as operating engineers. For more detail, see individual entries.	10

Source: U.S. Department of Labor, Bureau of Labor Statistics, Occupational Projections and Training Data, Bulletin 1918, pp. 40-43.

a/ Percent estimates based on 1974 apprenticeship completions and projected average annual job openings, 1974-85.

APPENDIX E-6

PRINTING CRAFTS

Printing is one of the few industries where technological change through the general introduction of computerized and highly automated high-speed machinery has created a new occupational structure with significantly lower skill requirements. The 1970 Census lists the following traditional craft titles:

> Compositors and Typesetters (422-423); Electrotypers and Stereotypers (434); Photoengravers and Lithographers (515); Pressmen and Plate Printers (5[illegible]31); and Bookbinders (405).

In the composing room, "hot" type has been replaced by "cold" type through the use of the camera and the computer in the production process. In the traditional method, the compositor or typesetter uses a linotype machine to cast slugs from hot metal which are then formed into plates, or uses a semiautomatic monotype machine which when fed a punched tape produces such slugs automatically. Phototypesetting or photocomposition, in contrast, depends upon the operation of a specialized electric typewriter that produces copy translatable into punched tape by an optical character-reading machine (OCR). This tape then goes to the video-display terminal (VDT) operator who projects the copy of the VDT screen for correction, editing, margin justification, etc. Through the use of "mnemonic" keys, the corrected tape is fed to a minicomputer and the final product is exposed to photosensitized paper for high-speed production and final paste-up. With the latest computer-type models, the process is entirely electronic rather than photographic.

While small letter presses and job shops continue to use traditional methods, the technical change described, with the resulting dramatic increase in the speed of typecasting, has been the hallmark of large-scale printing. In terms of a standard newspaper line, a monotype operator could cast five lines of type per minute; early photomachines set 40 lines a minute, later ones doubled that rate of speed and the most recent, which are actually computers, can set 1,000 lines per minute. Succeeding generations of typesetting machines have also provided greater versatility with respect to typeface and size. A computerized typesetter can hold in its memory 100 fonts and 126 characters each, producing type in twentieths of a point increments from 3- to 72-point type.

A major consequence of these trends has been the deskilling of the typesetting occupations. Composing room processes are now dominated by keyboard skills similar to those required for any standard typewriter, although additional keys may add degrees of complexity.

The advent of photo-offset printing has led to a serious decline in the demand for electrotypers, stereotypers and photoengravers. The demand for lithographers, on the other hand, has increased and will

probably continue to do so as the trend toward in-house offset shops continues. While the 1970 census gives the number of lithographers (including photoengravers) as approximately 35,000, the BLS estimates their employment at 80,000 for 1974 (Bulletin 1918). Lithography actually comprises four specialties--camera operators, lithographic artists, strippers and platemakers. Apprenticeship supplies about 12 percent of the annual demand for lithographers. These are workers who presumably can handle all lithographic operations. Since subspecialties are identifiable, it is likely that these are learned on the job, with some entry workers having pre-employment training in vocational and trade schools.

The skills of lithographers are not immune to technological advance. Automatic processes have been introduced into the production of half-tone prints. In effect, the worker is a specialized computer operator whose programs consist of data on shading, focus, distance, etc. The film input comes from a fully automatic developing tank, which also works at high speed. In 1977, both Xerox and Kodak introduced electronic printing systems that utilized lasers to transform information stored on magnetic tapes into printed pages. These systems are expected to be particularly useful for the production of business forms which have a high rate of obsolescence and account for a good deal of in-house printing.

The operation of printing presses is in some ways more complex in the era of "cold" type because the plates have shallower markings that make ink control more difficult. Apprentice completions in this trade have also been running at about 12 percent of new openings. The advent of high-speed presses has diminished the number of press operators needed to handle an ever-increasing volume of printed material. Furthermore, routine printed matter can now be produced in the form of direct computer output.

In-plant printing is a post-World War II phenomenon which in spite of its rapid growth has been largely ignored by training institutions until recently when it became clear that the decline in the demand for traditionally trained printing craftsmen was not likely to be reversed.

The occupational structure is less skilled and less specialized than that of the regular commercial sector. The basic processes consist of the operation of copier machines, inking, collating and binding; the more skilled workers do paste-ups and prepare final copy. The increasingly sophisticated features of copier machines--high-speed, color, and in the near future, electronic transmission to terminals--mean that operators are not merely "button-pushers." Pre-employment training may be an advantage even if it is not strictly necessary. Large companies usually train their own operators. In selecting training, they look for basic literacy, an appreciation of graphics and that imponderable, the "right" personality.

The work has a "factory" image and is definitely production-oriented. While wages are generally competitive with the medium-level clericals, some workers accept lower wages to get white-collar jobs.

An internal job ladder exists, especially in larger firms, with access to managerial jobs frequently available from within.

Taken together, recent developments in printing mean an increased number of computer operators, programmers, systems analysts, repair and maintenance personnel and keyboard operators. Traditional crafts will continue to decline, with some losing more ground than others. Training is likely to move still further away from apprenticeship. Large companies, both in the printing industry and those who operate in-house printing facilities, are likely to train new workers on the job, beginning as helpers. In cities where printing trades are taught in vocational high schools, area technical centers, proprietary schools, or two-year colleges, employers may recruit partially trained workers. Only a close examination of the ties of particular firms with particular schools can result in judgments as to the efficacy of investments in this kind of pre-employment training.

In spite of their inclusion here, most bookbinders are actually machine operatives who learn their skills on the job in less than two years. Skilled hand bookbinders learn the trade through apprenticeship or similarly structured on-the-job training, but they are few in number. The pay scale for this set of occupations is lower than the other printing trades, possibly because a number of the machine operations traditionally have been performed by women.

APPENDIX E-7

CLERICAL OCCUPATIONS

While a large number of job titles are needed to describe the clerical occupations, they can be divided into two major categories, office and nonoffice. Office clericals with specific skills receive pre-employment training while nonoffice and the least skilled of the office clericals usually receive their training after employment.

The office clericals with specific skills are concentrated in Cluster 2. Included are bookkeepers (305),* bookkeeping and billing machine operators (341), computer and peripheral equipment operators (343),* key punch operators (345),* tabulating machine operators (350), office machine operators, n.e.c. (355), secretaries (370-372),* stenographers (376) and typists (391).* Typists, keypunch operators and operators of magnetic-tape typewriters used in the word-processing and printing industries, together contribute a "keyboard skills" sub-cluster. Those with less specific skills such as payroll and time-keeping clerks (360), receptionists (364), and statistical clerks (375) are found with other occupations requiring three months to two years of post-employment training in Cluster 5. The least skilled office clericals who receive less than three months training, entirely on the job, are the file clerks (325), calculating machine operators (342) and duplicating machine operators (344), all in Cluster 6. Together, three out of five clericals are in the office category.

Only one nonoffice or plant clerical occupation--the small category of telegraph operators (384)--requires pre-employment training and is located in Cluster 2. The rest, who receive varying amounts of post-employment training, are found either in Cluster 5: dispatcher and starters, vehicle (315); estimators and investigators, n.e.c. (321); expediters and production controllers (323); meter readers, utilities (334); postal clerks (361); proofreaders (362); stock clerk and storekeepers (381); teacher aides (382) and ticket, station and express agents (390), or in Cluster 6: bank tellers (301); billing clerks (303); cashiers (310); clerical assistants, social welfare (311); collectors, bill and account (313); counter clerks, except food (314); enumerators and interviewers (320); library attendants and assistants (330); mail carriers, post office (331); mail handlers, except post office (332); messengers and office boys (333); telegraph messengers (383); telephone operators (385); and weighers (392).

Bank tellers, telephone operators and postal clerks receive brief, structured training after employment, as do enumerators and interviewers. The proliferation of pre-employment training courses has led to two-week courses for cashiers and calculating machine operators and even a six-month training course for messengers (not altogether unreasonable in such large, urban areas as New York City). Computerization in some

*See individual notes under these occupations in Appendix D.

areas once dominated by lower-level clerical occupations has led to dismissal of clerks by banks and insurance companies.

Secretaries, stenographers and typists--the quintessential high-level office clericals for whom pre-employment training is necessary--together constitute a large number--almost four million in 1970. At present "shortages" of well-trained secretaries, stenographers and typists are reported nationally, particularly in those regions of the country where general unemployment rates are low. This situation has been induced in part by the increased college attendance of young women in these still sex-segregated occupations as well as the new occupational possibilities opened up to women by government equal employment opportunity mandates. Technological trends indicate, however, that in large firms at least, the increasingly expensive private secretary and vanishing stenographer will be replaced by "word-processing" centers employing a computer technology similar to that which has revolutionized the printing industry. A typical system consists of a keyboard for typing material taken from dictaphones; a video screen on which the material is displayed and on which all corrections can be made electronically; and a typewriter-quality printer which can turn out the final material at the rate of almost 700 words per minute. The information can be stored on tape or discs for file, retrieval or transmission elsewhere for automatic reproduction. In use at the present are optical character recognition (O.C.R.) machines that read text into the word processing systems and relay documents over standard Telex lines.

The present high initial costs of word processing equipment effectively restricts its use to large firms, but decreasing costs, as was the case in the data-processing industry, will increase its availability. Until that time, the labor supply of students and housewives can be tapped by part-time and flexi-time arrangements.

Securing an adequate office clerical labor force has been perceived by New York City employers as problematic for at least two decades. Although clericals are still predominantly female, underlying shifts in New York City labor market trends in the decade of the seventies have operated to decrease female labor force participation in the clerical field pari passu with an increase in the professional, managerial and service occupations. 229/ Such shifts have been reinforced by the fact that at the end of the seventies, as at the beginning, relatively low entry-level salaries, high turnover rates and limited promotion possibilities remain features of this occupational group. 230/ The major complaint of employers is, however, directed primarily at quality and not quantity and differs little in 1979 from the frequently cited conclusion reached in 1970 that ". . . the present state of public

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229/ Karen Gerard and Mary McCormick, The Impact of Women on the Economy of New York City. Prepared for Women United for New York, 1978.

230/ Anne Fribourg, Clerical Jobs in the Financial Industry in New York City. New York: New York Department for City Planning, July 1972.

education in New York City is the most important factor hampering business in its efforts to employ qualified clerical help." 231/

Business education in the New York City public high schools concerns itself with three areas: secretarial studies, accounting and distributive education and, in some schools, with a fourth, data processing. The Business Education Advisory Commission of the Advisory Council for Occupational Education serves as a conduit from employers to the Board of Education's Bureau of Business and Distributive Education. The Bureau in turn serves in an advisory capacity on a staff level to the Center for Career and Occupational Education within the Board, but has no line responsibilities or power over the high schools, which are responsible to the Division of High Schools alone. One consequence of this diffusion of responsibilities is a strengthening of the role of the high school principal; according to one student of business education, the support of the principal, at least in an academic high school, can make a critical difference in the success of the business curriculum. 232/ An informal consensus seems to exist among employers that the best secretaries come out of high-level proprietary schools (which can of course "cream" their applicants), then from the parochial schools and last, from the public schools, with some exception made for those students participating in cooperative work-study programs.

A more positive aspect of business skills training in New York City has resulted from the new "vocationalism" among young people which has made business education more attractive to able students in the high schools as well as in the City's two-year community colleges. A persisting complaint about business education, however, one it shares with vocational education in general, is the failure, for a variety of reasons, to keep up with technological change. Bookkeeping, for example, as taught in the high schools, is, to quote two long-time observers,

> . . .prevailingly pre-technological (manual bookkeeping systems), whereas (a) computerization is the hallmark of the large employer and (b) in a large urban center such as New York City, the one-fifth of all private employers who are large ones (more than ten employees) account for seven-eighths of all nongovernmental bookkeeping employment. . .Computerization has either removed or greatly reduced the need of entry-level employees to understand concepts and principles.
>
> . . .employees themselves overwhelmingly identified on-the-job learning as the source of their ability to perform their job duties.

231/ The Economic Development Council, New York City's Clerical Manpower Requirements and Problems. New York, 1970.

232/ Danella Schiffer, Review of Business Education in New York City's High Schools for the Business Education Advisory Commission. New York: Economic Development Council, June 14, 1976.

> . . .job advancement depends. . .on job experience and performance and secondarily, on post-secondary instruction in bookkeeping, not on pre-employment high school study of bookkeeping. 233/

The major role played by such traditionally large employers of clericals as the financial industry, large corporate headquarters and their affiliated network of suppliers of such "high services" as legal services, market research, advertising, and the like, in the economy of New York City makes it highly likely that future New York City employment will be sought increasingly in its "paper factories" rather than in the traditional factories of the industrial world. It is obvious that if New York is to maintain its comparative advantage in the "high-services" area, training for the clerical underpinning of these industries must reflect technical change and exhibit a realistic mix of pre- and post-employment training.

233/ Lee Cohen and Leonard J. West, "Occupational Curricula: The School/Job Match," New York University Education Quarterly, Spring 1978, p. 19.

APPENDIX E-8

SALES OCCUPATIONS

Current (1978) estimates place the total number of persons engaged in sales activities at five and one-half million, distributed as follows: retail sales 2.8 million, wholesale sales 680,000, manufacturers' sales 420,000, insurance agents 385,000, securities sales 220,000 and miscellaneous, the remaining one million.

Excluding insurance and securities salesmen, who are considered separately, certain semantic clues to the classification of the sales occupations should be noted. In terms of prestige, earnings and training time, sales "representatives" (Census Codes 281, 282), are at the higher level of the hierarchy. They usually require technical knowledge of the product, which may include "big ticket" producer and consumer durables, or specialized services like computer software. For these sales occupations, a certain amount of college and technical training may be necessary. These are followed by salesmen of services and construction (Census Code 285) and in retail trade (Census Code 284) who require less specialized training. Last, in terms of training requirement and usually of earnings, are sales clerks; retail trade (Census Code 283) who generally acquire their training on the job in smaller concerns and are most likely to be women. 234/

Large stores frequently offer in-house training courses and a sales job may be the first rung on a promotional ladder for promising candidates, especially for college graduates hired as assistant buyers. Public and private vocational schools also offer courses in "distributive education" and merchandising which, while offering general orientation to the industry, do not lead to the same type of managerial ladder described above.

234/ See Gary McKible, "A Look at an Occupation Divided: Saleswork," Industrial and Labor Relations Forum, 1976, pp. 77-105.

APPENDIX E-9

APPLIANCE REPAIR, CONSUMER GOODS
(Census Codes No. 485, 470 and 482)

The acquisition of skills in the repair fields is particularly fragmented because of differences in types of service organization and the variation in relationship between manufacturers and service centers. The industry has one-person shops in which the owner is more technician than businessman; repair centers identified with a manufacturer's brand name, which may be owned by the manufacturer or a large merchandiser; and finally, large independent service companies that act as authorized service centers for one or more brands.

The majority of shops are small; in television and radio repair, shops of fewer than 10 employees predominate, and 76 percent are owner-operated. These shops provide little opportunity for on-the-job training, except for family members. High labor repair charges, paired with improvements in technology which have drastically reduced the price of the finished product, have operated to virtually eliminate the economic viability of small appliance repair. This fact has not, however received adequate attention from planners of training programs. Large service organizations provide on-the-job training, and for certain fields, the armed forces have also been suppliers of experienced workers. An important contribution to maintaining and updating skills is provided by manufacturers in a systematic way that may include actual vendor training as well as the production of service manuals.

This is a field in which vocational school training has increased in both the public and proprietary sectors with mixed results, depending entirely on the relationship of the particular school with the industry. These ties are hard to establish because of the large number and dispersion of shops.

Periodic, but widely publicized "exposes" of incompetence, fraud, or both, on the part of repairers, have led to demands for licensing or other means of certifying competence.

APPENDIX E-10

INSURANCE INDUSTRY OCCUPATIONS

265 Insurance Agents
326 Insurance Adjusters

The insurance industry has a network of training and certifying organizations for both general and specialized subjects. The Life Office Management Association (LOMA), based in New York, provides the education officers of member companies with materials to be used either for self-study or in company-based classes. Its program is divided into two "Courses." Completion of Course I, "Fundamentals," which has six parts, earns a certificate; completion of Course II, "Advanced Life Insurance," which has six parts, earns a Fellowship diploma. Each part is completed upon passage of an examination.

The casualty branch of the industry has a parallel organization for training. In addition, the charter life underwriters and the property casualty underwriters administer certifying programs consisting of a series of 10 two-hour examinations. The Life Insurance Marketing Research Association of Hartford offers programs to prepare sales agents for licensing examinations.

Although a few universities (mainly in the Philadelphia area) and specialized schools (such as the College of Insurance in New York City) offer curricula in insurance, most skill acquisition occurs through the mechanisms outlined above. All personnel are eligible to participate; while many earn certificates, fellows now tend to come from college graduate recruits who have the educational development to pass the higher-level courses. In addition to the specialized activities of policy-owner service, claims and underwriting, employees with professional training--such as physicians, lawyers, accountants and data-processing specialists--also participate in the fellowship training program because of the importance of industry-based knowledge.

All insurance agents and most insurance brokers must be licensed in the state where they plan to operate. Licenses are granted on the basis of written examination on insurance fundamentals and the state's insurance regulations.

APPENDIX F

STANDARD INDUSTRIAL CLASSIFICATIONS (SIC)

INDUSTRY GROUPS

Division A - Agriculture, forestry, and fishing
Division B - Mining
Division C - Construction

Major Group 15 - Building construction - general contractors and operative builders

*16 - Construction other than building construction - general contractors

17 - Construction - special trade contractors

173 - Electrical work
174 - Masonry, stonework, and plastering
175 - Carpentering and flooring
179 - Miscellaneous special trade contractors

Division D - Manufacturing

Major Group *19 - Ordnance and accessories
20 - Food and kindred products

*21 - Tobacco manufactures

22 - Textile mill products

23 - Apparel and other finished products made from fabrics and similar materials

24 - Lumber and wood products, except furniture

25 - Furniture and fixtures

26 - Paper and allied products

*27 - Printing, publishing, and allied industries

28 - Chemicals and allied products

*29 - Petroleum refining and related industries

*30 - Rubber and miscellaneous plastics products

*31 - Leather and leather products

*Not published for New York City.

Major Group 32 - Stone, clay, glass, and concrete products

33 - Primary metal products

34 - Fabricated metal products, except machinery and transportation equipment

*35 - Machinery, except electrical

36 - Electrical and electronic machinery, equipment, and supplies

37 - Transportation equipment

38 - Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks

39 - Miscellaneous manufacturing industries

Division E - Transportation, communications, electric, gas, and sanitary services

Major Group *40 - Railroad transportation

41 - Local and suburban transit and interurban highway passenger transportation

411 - Local and suburban transportation
412 - Taxicabs

42 - Motor freight transportation and warehousing

421 - Trucking, local and long distance

43 - U. S. Postal Service

44 - Water transportation

441 - Deep sea foreign transportation
446 - Water transportation services

45 - Transportation by air

451 - Certificated air transportation

*46 - Pipe lines, except natural gas

47 - Transportation services

471 - Freight forwarding
472 - Arrangement of transportation

Major Group 48 - Communication

481 - Telephone communication

49 - Electric, gas, and sanitary services

493 - Combination companies and systems

Division F - Wholesale trade

Major Group 50 - Wholesale trade - durable goods

506 - Electrical goods

51 - Wholesale trade - nondurable goods

511 - Paper and paper products
512 - Drugs, proprietaries and sundries
514 - Groceries and related products
518 - Beer, wine, and distilled beverages

52 - Building materials, hardware, garden supply, and mobile home dealers

*53 - General merchandise stores

*54 - Food stores

*55 - Automotive dealers and gasoline service stations

551 - New and used car dealers

56 - Apparel and accessory stores

561 - Men's and boys' clothing and furnishings
562 - Women's ready-to-wear stores
566 - Shoe stores

57 - Furniture, home furnishings, and equipment stores

571 - Furniture and home furnishings stores

58 - Eating and drinking places

*59 - Miscellaneous retail

598 - Fuel and ice dealers

Division H - Finance, insurance, and real estate

Major Group 60 - Banking

602 - Commercial and stock savings banks
603 - Mutual savings banks

61 - Credit agencies other than banks

612 - Savings and loans associations
614 - Personal credit institutions
615 - Business credit institutions.

62 - Security and commodity brokers, dealers, exchanges, and services

621 - Security brokers and dealers
628 - Security and commodity services

63 - Insurance

631 - Life insurance
632 - Accident and health insurance
633 - Fire, marine and casualty insurance

64 - Insurance agents, brokers, and service

*65 - Real estate

*66 - Combinations of real estate, insurance, loans, law offices

*67 - Holding and other investment offices

Division I - Services

Major Group 70 - Hotels, rooming houses, camps, and other lodging places

701 - Hotels, tourist courts, and motels

*72 - Personal services

73 - Business services

731 - Advertising
732 - Credit reporting and collection
733 - Duplicating, mailing and stenographic services
734 - Services to buildings
739 - Business services, n.e.c.

Major Group*75 - Automotive repair, services, and garages

*76 - Miscellaneous repair services

*78 - Motion pictures

782 - Motion picture industries

79 - Amusement and recreation services, except motion pictures

794 - Miscellaneous amusement and recreation services

80 - Health services

807 - Medical and dental laboratories
809 - Health and allied services, n.e.c.

*81 - Legal services

*82 - Educational services

*83 - Social services

84 - Museums, art galleries, botanical and zoological gardens

841 - Museums and art galleries

86 - Membership organizations

861 - Business associations
862 - Professional organizations
863 - Labor organizations
864 - Civic and social associations
866 - Religious organizations
867 - Charitable organizations
869 - Nonprofit membership organizations, n.e.c.

*88 - Private households

89 - Miscellaneous services

891 - Engineering and architectural services
892 - Nonprofit research agencies
893 - Accounting, auditing and bookkeeping

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Division J - Public Administration

Major Group 91 - Executive, legislative, and general government, except finance

92 - Justice, public order, and safety

93 - Public finance, taxation, and monetary policy

94 - Administration of human resources programs

95 - Administration of environmental quality and housing programs

96 - Administration of economic programs

97 - National security and international affairs

Division K - Nonclassifiable establishments

Major Group 99 - Nonclassifiable establishments

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