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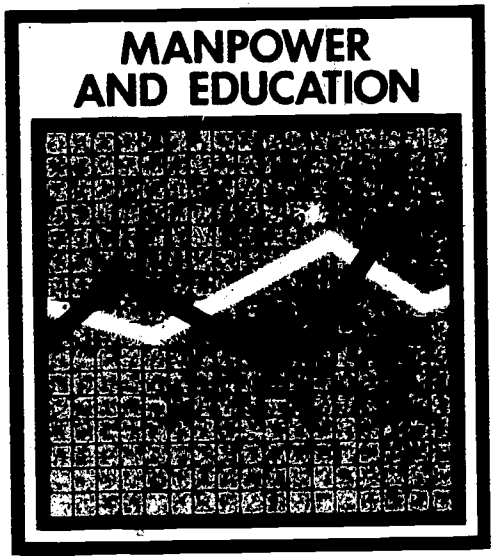
ABSTRACT

This report presents findings on the supply of college graduates in 1980 in the Southern region as compared to openings in which they may become employed. The projections of the Southern Regional Education Board (SREB) indicate that for a range of 421 occupations (the Comprehensive Projection), there will be a deficit of college educated workers. These occupations extend outside the traditional professional, technical, managerial jobs. The supply/demand comparisons for individual fields of study indicate that health, engineering, accounting, computer science and business administration majors will find a favorable labor market. Education and law school graduates will find a saturated market. Humanities and social science majors will experience difficulty if they are seeking jobs that specifically relate to their educational preparation. (Author/JMF)




# Supply and Demand for College Graduates in the South 1980



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SOUTHERN REGIONAL EDUCATION BOARD

# Highlights

- Students, in making their choices of college majors, are entitled to the best available information on the future supply and demand outlook for various occupations. This report presents manpower projections for the Southern region for 1980.
- The job market for college graduates may be defined in two ways: (1) from the conventional perspective which considers only professional-technical-managerial openings, and (2) from a comprehensive approach which considers all occupations as possible employment opportunities for college graduates.
- Projections of the number of college graduates in the Southern region in 1980 versus the number of openings indicate that there will be a surplus of 7 to 9 percent of college graduates under the conventional perspective. Under the comprehensive approach, however, there will be a 13 percent deficit of college graduates in 1980.
- Some fields for which the outlook appears favorable are engineering, most health professions and accounting. Education, law and communications appear to be less favorable fields of job opportunity.
- There are many fields of study for which the correspondence with specific occupations is less definite. For such fields of study the projected supply-demand comparisons are more tenuous. Prospects are favorable in computer and information sciences and business administration, for example.
- For graduates in social science, fine arts, foreign languages and letters, the outlook in occupations directly related to these studies appears unfavorable, unless graduates have skills that can be applied in business and government jobs.
- The job outlook for college majors is more favorable in some states than in others. The surplus of graduating students in some fields will be less acute if these graduates are willing to migrate to states and localities where more jobs are available.
- A more detailed comparison of the job outlook for college graduates, by states, and by fields of study, will be published in a forthcoming SREB report.

# Supply and Demand for College Graduates in the South, 1980

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# Foreword

The SREB Manpower and Education project, partially supported by a grant from the Exxon Education Foundation, has issued a number of reports devoted to occupational prospects for individual fields of study. In order to set these analyses within the context of a more complete statement for all college graduates, this overview was prepared as the first of a series evaluating the Southern manpower outlook for all degree fields. It is a project unique to the Southern region and one which educational planners at state, regional, and institutional levels as well as legislative and student career counselors should find applicable.

Winfred L. Godwin
President

# Introduction

This report presents findings of the SREB Manpower and Education project on the supply of college graduates in 1980 in the Southern region as compared to openings in which they may become employed.* The current realities of institutional and system-wide budget constraints, enrollment plateaus and employment of college graduates are of concern to students, institutions, legislative bodies and educational planners. Manpower information on the balance of projected supply and demand of occupations is an aid both to higher educational planning and to student career guidance in assessing alternate fields of study. It should, however, be emphasized that the materials presented in this report are intended to complement continued emphasis on student free choice of academic programs.

These findings for the Southern region constitute the first attempt of the SREB Manpower and Education project to combine data on projected available college graduates with projected occupational openings. There are numerous variables that could be added to the analysis to improve the projections (e.g., returnees to the labor market who compete with college graduates) if data were readily available. As new information is obtained, several series used in this report will be revised. The projections presented herein will be augmented in the future as additional data become available to permit refinements and improvements. This report deals with the outlook for the region as a whole. Subsequent reports will present supply and demand comparisons for various fields of study on a state by state basis.

Several terms need defining to orient the reader and facilitate communication of the findings. The explanations given below, in effect, summarize many details in methodology. Readers who are interested in greater detail may request such by contacting the authors.

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*The authors acknowledge, with appreciation, the review of an earlier draft by a number of individuals, including staff of several state higher educational agencies. Several of the many useful suggestions offered have been incorporated. The authors are solely responsible for opinions expressed.

## SUPPLY TERMS

### Projection of Supply

The projections of degrees by level, by state, and by field of study are based on the region's share of U.S. degrees, according to projections by the U.S. Office of Education (USOE), and the historical distribution of degrees in the region by degree levels relative to the U.S. historical distribution.[1] The distribution of degrees by field of study is based on changes in the distribution in the Southern region from 1964 to 1972, with adjustments to reflect a gradual convergence of the SREB distribution toward that projected by USOE for the nation in 1980.[2]

The total number of degrees at all levels projected for the region for 1980 exceeds the 1972 total by 18 percent, thus allowing for a moderate growth rate for the rest of the decade.

### Fields of Study

All graduates at all degree levels have been classified into 19 major fields of study. A number of subfields, well recognized as leading to specific occupations, were chosen for separate projections. For example, nursing and dental hygiene (subfields of the major field, "health professions") definitely lead to the occupations of registered nurse and dental hygienist, respectively. However, other subfields, such as economics and sociology, while they may lead to the specific occupations of economist and sociologist, often do not, and therefore have not been projected as subfields separate from their major field of study. The 19 major fields of study, and the respective shares each one is projected to encompass at the bachelor's and master's levels in 1980, are shown in Appendix 1.

### Market-Ready Supply of College Graduates

This differentiates the supply of total degrees in any one year, at all levels, from the supply of graduates in that year who are actually new entrants into the labor market. It adjusts for a small proportion of female BA's who do not enter the labor market, for bachelor's degree recipients who continue as full-time graduate students and thus are not available to work, and for graduate students who were already employed full-time in their own fields while earning advanced degrees, so that they do not constitute *new* entrants into the college level job market. Figure 1 portrays the flow of college graduates and the differentiation in any one year between graduates and market-ready supply. Total market-ready degree projections for the region in 1980 at the BA, MA and Ph.D. levels combined are shown in Appendix 2.

### Education Field of Study

The education field of study classification in this report has been adjusted to include the number of graduates estimated to have earned

teaching certificates in conjunction with other academic fields of study. Each academic field of study that contributes graduates with teaching certificates has been adjusted downwards by the corresponding estimated percentage of teaching certificates.

## DEMAND TERMS

This report develops two projections of 1980 occupational openings in the region:

### Comprehensive Projection

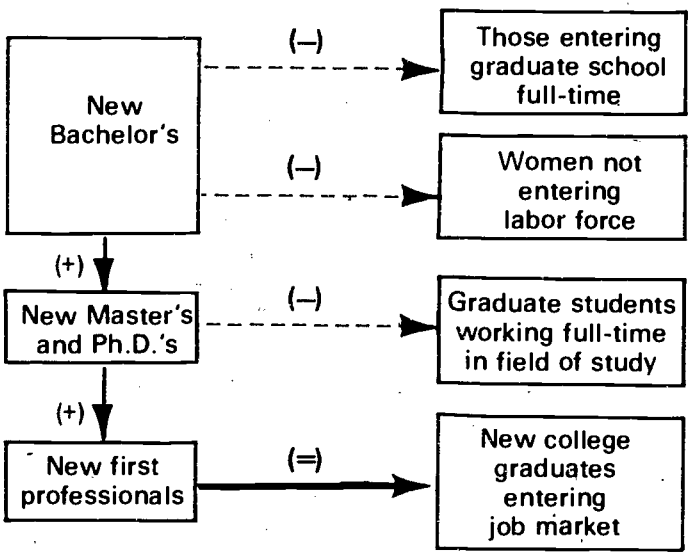
This projection covers openings across the entire range of the 421 occupations in the U.S. Bureau of the Census classification system, from teacher to truck driver, or physician to postman.

### Conventional Projection

This projection covers only 136 occupations in the professional-technical-managerial areas that have been the "traditional" job market for college graduates. The 136 occupations include only those in which in 1970 at least 15 percent of the workers had completed at least four years in a college program.

**Figure 1**

**TRANSLATING COLLEGE GRADUATES INTO MARKET-READY SUPPLY**



An example best illustrates the underlying rationale for the two projections: The Conventional Projection does not include openings for policemen, because in 1970 less than 15 percent of all policemen were college graduates, namely six percent. The Comprehensive Projection, on the other hand, includes *some* openings for policemen because more and more policemen by 1975 do have college training, and local governments seem eager to upgrade the educational attainment levels of their security forces. It is rationalized that if more occupations show growing percentages of workers with college degrees, why not include openings for policemen, for secretaries, and in fact, for all occupations in projecting employment opportunities for 1980's graduates?

### Openings

Openings in occupations include those resulting from expansion of employment as industries grow, and from retirement, death and other separations from the labor force. The openings are average annual openings for the 1970-80 period.

### Portion of Openings to be Filled by College Graduates

Neither in the Comprehensive nor Conventional Projections are *all* openings in each occupation considered on the demand side as employment opportunities for college graduates. Instead a percentage has been developed that represents, for each occupation, the portion of openings to be filled by persons with four or more years of college. This 1980 educational attainment percentage was obtained for each occupation by extending the U.S. pattern of the 1960-70 period to 1980. The 1980 percentage of all college level workers in an occupation was then transformed into the percentage of *new* workers needed with such educational attainment levels. Resulting percentages to be applied to openings range, for example, from 100 percent for physicians to 8 percent for policemen.

### Data Sources

Two data sources were used to estimate the openings for occupations. The National Planning Association employment by industry projections for 1980 were converted to demand figures by SREB and are shown in italics.[3] The Departments of Economic Security (DES) in each of the 14 Southern states are the source of the DES projections and are shown in bold print.[4] Further detail on how employment by industry projections were translated into occupational openings projections is presented in the Technical Notes, page 00.

The average annual openings estimated for college graduates in the region for 1970-80 in each occupation under both data sources are shown in Appendix 3.

# II. Employment Outlook for College Graduates

These projections may be viewed from two perspectives: (1) the total number of available college graduates relative to openings for college graduates — regardless of fields of study, and (2) the supply/demand comparison for any one specific field of study. The summary of findings for the two projections are shown in Table I, and illustrated in Figure 2.

**Table I**

**SUPPLY/DEMAND COMPARISONS FOR COLLEGE GRADUATES, SREB REGION, 1980**

| | Projected Average Annual Openings | | | |
|---|---|---|---|---|
| | Comprehensive Projection (entire range of 421 occupations) | Conventional Projection (136 prof.-tech.-mgr. occupations) | | Market-Ready College Graduates |
| | | Low | High | |
| Number | *290,600* | **235,600** | *240,700* | **258,300** |
| Surplus or (Deficit) | *(32,300)* | **22,700** | *17,600* | |
| Percentage Surplus or (Deficit) Relative to Graduates | **(13%)** | **9%** | **7%** | |

The findings in Table I suggest that if the intent of college graduates is to seek employment in the traditional professional-technical-managerial sector, many will be disappointed. The Conventional Projection shows a surplus of 7 to 9 percent, depending upon the data source.

If, on the other hand, college graduates may be assumed to be preparing themselves for the entire range of 421 occupations, there will be a deficit of 13 percent on the basis of the educational attainment levels (or percentages of college educated persons in each occupation) projected for 1980 by extension of previous trends.

This report makes no value judgments as to the appropriateness of the Comprehensive Projection versus the Conventional Projection. It recognizes that there are at least two interpretations to explain the representation of college graduates in a growing array of occupations. One interpretation is that the work of a policeman, secretary, or almost any

other occupation can be performed more effectively when filled by college graduates, thereby increasing the productivity of the labor force. Another interpretation is simply that as more college graduates become available, there are sufficient numbers to spill over into more occupations, regardless of the jobs' requirements for skills and training.

Even in the 1960's during a very expansionary economy, when college graduates were in great demand for professional-technical jobs, many entered occupations for which, traditionally, a college degree did not seem necessary. This past experience suggests it is not unreasonable, in projecting 1980 "college level" employment, to consider occupations other than those traditionally regarded as requiring a college degree.

### Supply/Demand Comparisons by Fields of Study

In addition to comparing overall prospects for 1980 college graduates in the region, this report examines opportunities by fields of study. Such analysis is more feasible and meaningful for some fields of study than for others. Where there is a clear correspondence between a field of study and an occupation (as for example the field of medicine versus openings for physicans and osteopaths), comparisons of market-ready degrees versus openings are valid. However, there are many fields of study that lead to a great variety of occupations; and, vice versa, occupations draw their labor force from a multiplicity of fields of study. Social science graduates may end up as historians, office managers or salesmen. Or, alternately, salesmen's jobs may be filled by business administration, English or math majors, to give only a few examples of the difficulty inherent in such comparisons.

This correspondence problem is handled in two ways in this report. Comparisons for fields of study, where the correspondence to specific occupations is well recognized, are shown in Table II and illustrated in Figure 3. The correspondence between each of the fields in Table II and the respective occupational categories included in the respective demand projections are itemized in Appendix 4. Only occupations included under the Conventional Projection are shown in Table II. Fields where the correspondence is less obvious are discussed below on a field by field basis.

### Health Fields

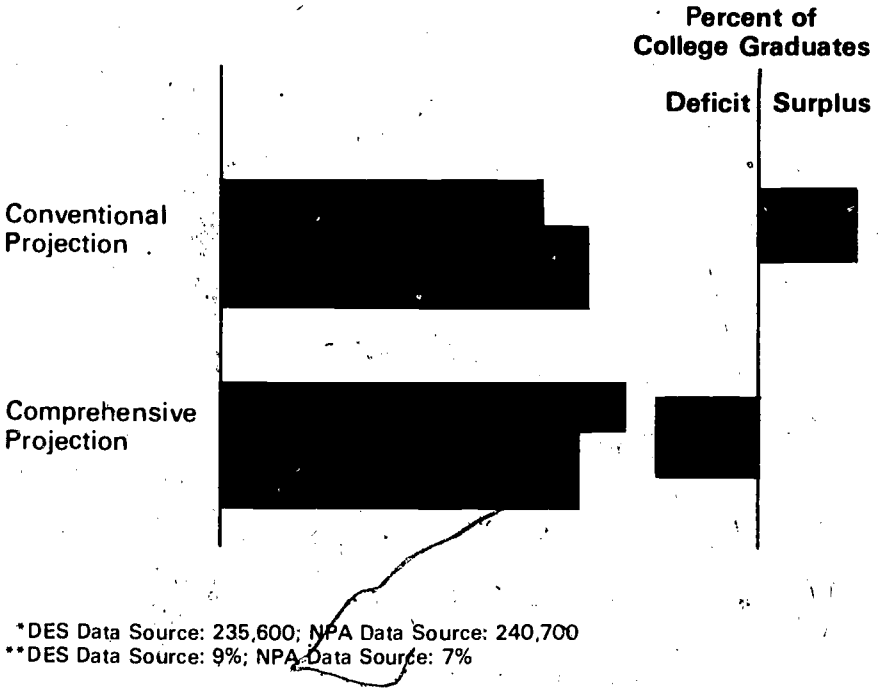
Most health fields show a deficit supply relative to demand. This is particularly so for the field of therapy (which includes both occupational and physical therapy). The only field where demand is less than supply according to both projections is pharmacy. The situation in nursing may be more difficult than indicated in the comparisons because this is a field where returning workers may play an important role, and these have not been included in the analysis.

The serious undersupply of graduates in hospital and health care administration may not be as severe as the data indicate because, in addition to graduates in this specialty, business administration and

other graduates will also be available for filling the demand. Generally the data indicate that students majoring in the health professions will continue to find employment opportunities to be quite favorable.

**Figure 2**

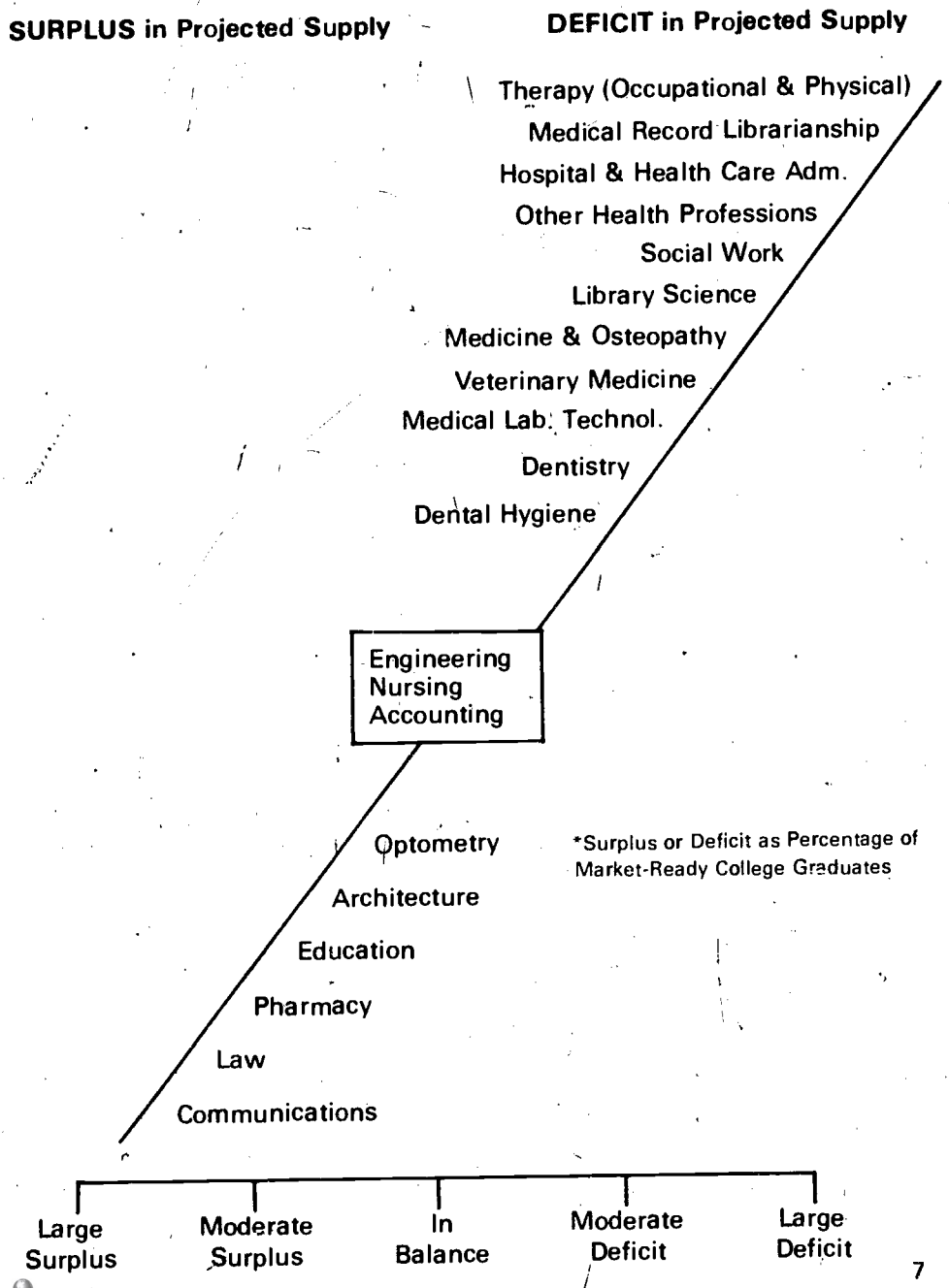
**Supply/Demand Comparisons for Market-Ready College Graduates SREB Region, 1980**




*DES Data Source: 235,600; NPA Data Source: 240,700
**DES Data Source: 9%; NPA Data Source: 7%

Figure 3

**SUPPLY SURPLUS OR DEFICIT* FOR SELECTED FIELDS OF STUDY SREB Region, 1980**



## Table II

### Regional Supply/Demand Comparisons
### SREB Region, 1980

| Health Fields | Average Annual Openings for College Graduates | | Market-Ready Degrees |
|---|---|---|---|
| | Low | High | |
| Hospital & Health Care Adm. | 1,200 | 1,500 | 500 |
| Nursing | 4,200 | 5,400 | 4,900 |
| Dentistry | 1,500 | 1,600 | 1,400 |
| Medicine & Osteopathy | 4,100 | 5,500 | 4,000 |
| Optometry | 200 | 300 | 300 |
| Pharmacy | 1,600 | 1,700 | 2,200 |
| Therapy | 1,500 | 2,000 | 500 |
| Dental Hygiene | 200 | 300 | 300 |
| Medical Record Librarian | 300 | 300 | 100 |
| Veterinary Medicine | 750 | 800 | 650 |
| Medical Lab Technology | 2,100 | 2,500 | 2,000 |
| Other Health Professions | 1,500 | 2,100 | 800 |
| **Other Professional Fields** | | | |
| Architecture | 900 | 1,000 | 1,200* |
| Accounting | 5,700 | 6,900 | 6,650 |
| Communications | 2,300 | 2,500 | 4,200 |
| Education | 52,200 | 54,200 | 64,100-67,600** |
| Engineering | 10,900 | 11,500 | 11,800 |
| Law | 4,900 | 5,100 | 7,800 |
| Library Science | 2,400 | 2,600 | 1,500-1,900*** |
| Social Work | 3,600 | 4,900 | 2,200-2,500*** |

*This excludes degrees in urban and regional planning.

**Includes graduates in other fields who have teaching certificates.

***The higher projection is based on the assumption that the percentage of graduate students already working in their field while studying is half of the proportion assumed for candidates in other advanced study fields. The concentration of available academic programs relative to the wide dispersion of jobs makes it unlikely that the average 41 percent of all MA level students found to be working in related occupations can be applied here. (See John A. Creager, *The American Graduate Student: A Normative Description*, American Council on Educational Research Reports, Vol. 6, No. 5, 1971, p. 48).

## Other Professional Fields

For the non-health professions the situation is mixed. Supply vastly exceeds demand under both data sources in the field of law. Education also is overcrowded, which mirrors conditions already present for graduates in the early 1970's. The labor market in education will be even worse for graduates than is suggested by the supply/demand comparisons shown in Table II because of returning teachers who will create an additional oversupply relative to openings. This finding complements the results of a more detailed examination of prospects in the teaching profession recently published by the SREB Manpower and Education Project.[5]

Both sources show an oversupply of graduates in the field of communications. The occupational openings paired against graduates in this field are for editors and reporters, public relations workers, and radio and television announcers. Each of these occupations covers a great variety of subcategories. Although communications majors might have "first crack" at openings in these occupations, they will face additional competition from graduates in other disciplines such as English, political science, etc.

Professions that appear favorable for graduates are accounting, engineering, library science and social work. The outcomes for accounting and engineering in this analysis show a balance between demand and supply, which is somewhat more conservative from the students' perspective than current reports of an undersupply in these fields would indicate.

The outlook for library science majors refers to openings for librarians outside of the public school systems. Library science graduates estimated to have teaching certificates are excluded from the library science market-ready projections and are included under "education." A recent U.S. Department of Labor study on the outlook for librarians finds 2,000 more average annual openings for the 1970-85 period in the U.S. than available graduates in library science, and concludes ". . . new graduates may be reasonably certain of securing a job — although not necessarily in the locality or at the salary level they prefer. . . . Job prospects for entering librarians without a degree in librarianship are likely to be sharply limited."[6]

The outlook for social workers is highly volatile since it depends upon the periodic directional changes of public policy in funding social services. Under both data sources the outlook appears more favorable than the current labor market suggests.

Supply/demand comparisons for other fields of study are even more difficult to make. There is much less certainty, for example, for occupations to be entered by graduates with degrees in social sciences or mathematics than there is for graduates in the fields included in Table II. An effort has been made to identify occupations that appear relevant to the remaining fields; however, in each case qualifications as to these relationships are appropriate.

### Agriculture

The projected annual market-ready supply in this field is 4,700. Relevant occupations under the Conventional Projection in which at least 15 percent of the workers had college degrees in 1970 are farm management advisors, foresters and conservationists, agricultural scientists and agriculture teachers. Occupational demand in these categories ranges from 600 to *1,000,* or far short of the projected graduates. Additionally, however, the Comprehensive Projection indicates *1,500* openings in farming occupations which in 1970 had fewer than 15 percent workers with college degrees. No doubt graduates in the field of agriculture and natural resources will also find openings in agribusiness which are unaccounted for in the above openings.

### Biological Sciences

The projected market-ready supply in this field is 8,700. Directly relevant occupations under the Conventional Projection are biological scientists, marine scientists and college biology teachers. (Openings for non-college biology teachers are included in the education openings, and biology graduates with teaching certificates were paired against those openings.) Total occupational openings in these categories range from 900 to *1,300.* Additionally, of course, biology graduates will seek employment for positions in many other occupations, such as laboratory technicians and other health occupation openings, that do not require specific professional licensing, for which an undersupply of graduates was shown in Table II. It is doubtful, however, that these openings will bring into balance what otherwise appears to be an oversupply of biology majors.

### Computer and Information Sciences

The market-ready supply in this field is projected as 1,100. Total occupational openings under the Conventional Projection, according to both data sources, outnumber graduates by more than two to one. However, one qualification to this very favorable outlook, is that not all graduates with skills in computer sciences graduate with degrees specifically in this field; but some may acquire these skills through business administration or other majors. This makes the comparison of degrees versus openings difficult. Generally, however, it appears that this will continue to be a very favorable field for graduates in the region.

### Fine and Applied Arts

The market-ready supply in this field is projected as 6,800. Relevant occupations under the Conventional Projection are college art, drama, and music teachers, actors, designers, musicians and composers, painters and sculptors, archivists and curators, writers, artists and entertainers. Occupational demand in these categories ranges from 1,900 to *2,200* under the two data sources. (Again, non-college art

teachers and certified graduates are both considered in the outlook for education.)

Although the outlook for majors in the arts field is limited according to the above findings, graduates in these fields will also take employment in business occupations that may or may not be directly related to their training, thus offsetting the otherwise limited demand relative to total available supply.

### Foreign Languages

The market-ready supply in this field is projected at 2,800. Relevant occupations under the Conventional Projection are college foreign language teachers, with demand ranging from 400 to *500* according to the two data sources. (Foreign language graduates with teaching certificates have been included in the supply that is compared to non-college education openings in Table II.) Graduates with foreign language skills will find additional openings that are relevant to their training, such as airline stewardesses, secretaries, and business occupations. It is difficult to forecast whether enough openings will be available in these areas to offset what otherwise appears to be a serious oversupply of graduates.

### Home Economics

The market-ready supply in this field is projected at 2,600. Relevant occupational positions under the Conventional Projection are dietitians, home management advisors and college home economics teachers. Occupational demand in these categories ranges from 700 to *900*. (Home economics graduates with teaching certificates have been included in the supply that is compared to non-college education openings in Table II). Additionally, home economics graduates will find relevant employment in occupations which in 1970 had fewer than 15 percent workers with college degrees. For example, the Comprehensive Projection forecasts *700* openings for child care workers and *800* for restaurant managers with college degrees. (However the child care openings will also appeal to education majors who were shown to be in oversupply in Table II.) Because of the great fluidity between field of study and likely occupations for eventual employment, it is difficult to forecast what the outlook will be for home economics graduates. A forthcoming SREB Manpower and Education report deals with this problem.

### Letters

The broad field of "letters" includes English, literature, philosophy, and associated majors. The market-ready supply for the entire field, after adjustment for those estimated to have teacher certificates and ready for employment as non-college English teachers, is projected at 12,000. Relevant occupations for majors in "letters" are difficult to identify. Total

demand projected for college English teachers and for authors ranges from 650 to *900* according to the two data sources. The history of employment experience of humanities graduates shows them working across the entire gamut of the occupational spectrum. A 1972 U.S. Census Bureau study of recent college graduates, for example, shows English and other humanities majors employed primarily as teachers but with representation also as accountants, social workers, managers, sales, and clerical workers.[7]

Although graduates in the field of letters will continue to compete for openings across the range of occupations, they will face competitin from graduates with more specific skills relative to the jobs to be filled. With the general oversupply of college graduates projected in this report for openings in the traditional professional-technical-managerial areas, graduates in the humanities will have difficulty in finding employment that they consider relevant to their educational preparation.

### Mathematics

The market-ready supply in this field, after adjustment for graduates with teaching certificates, is estimated at 6,000. Relevant occupations under the Conventional Projection are mathematician, statistician, actuary, mathematical technician, and college math teacher. Projected openings in these occupations range from 1,000 to *1,700* according to the two data sources.

Mathematics graduates will also seek employment in occupations less directly identified with their majors, including many jobs in business and government. Thus, it is difficult to isolate their total occupational demand aside from that in the most directly relevant occupations. To some extent they will face the same problem described for graduates in "letters"; they will be competing for openings in an overall market that has more graduates than jobs against candidates who have training and skills more specific to the tasks immediately at hand.

### Physical Sciences

The market-ready supply in this field, after adjustment for graduates estimated to have teaching certificates, is estimated at 4,500. Relevant occupations under the Conventional Projection are chemists, physicists and astronomers, geologists, atmospheric and space scientists, college teachers in the fields of chemistry, physics and other physical sciences, chemical technicians, and other physical scientists. Total openings in these occupations are projected to range from 2,100 to *2,300* according to the two data sources. The employment history of physical science graduates shows that they too find jobs in other areas such as engineering. This makes it difficult to draw any conclusions as to total outlook for the field. Current indications are that research and development activities in energy will provide new openings for scientists.

### Psychology

The market-ready supply in this field is estimated at 11,500. Relevant occupations under the Conventional Projection are psychologists, college psychology teachers and vocational education counselors. Projected openings in these occupations range from 3,800 to *4,300* according to the two data sources.

Graduates in psychology also find employment in many other occupational groupings such as health aides and welfare service aides. An increasing number of positions will be filled by college graduates in these occupations, despite the fact that in 1970 less than 15 percent of the workers had college degrees. Graduates in psychology will also find employment in seemingly unrelated areas, including the business world. However, as was pointed out earlier for other disciplines, for business occupations that require specific skills, graduates in fields that are specifically directed to training in these skills will have an edge over candidates from the humanities, social sciences, or psychology.

### Business Administration

The market-ready supply projection for graduates in business administration, exclusive of accounting majors, is 34,500. This covers a tremendous range of majors including specialties as diverse as personnel administration and insurance. Business administration graduates, regardless of their particular majors, find employment in more different occupations than possibly any other majors. A graduate in one particular business administration specialty is by no means limited in employment suitability to the one area of study emphasis.

It is difficult to isolate all occupational categories in which business administration majors might find relevant employment. In addition to obvious slots in the business and industrial world that deal with the producing, managing, selling, and purchasing functions, business administration majors are in demand in the governmental sector. Summation of openings in apparently relevant occupations in business and industry alone under the Conventional Projection yields in excess of 95,000 employment slots. When additional occupations included in the Comprehensive Projection are also added (for example, sales clerk and secretarial openings), the prospects are even greater. The data obtained in this study indicate that employment opportunities for business administration majors will be very favorable, despite their facing competition from majors in other fields seeking jobs in the same occupations.

### Social Science

Social science and area studies market-ready graduates are projected at 30,000. This group includes a wide span of disciplines — economics, sociology, history, and anthropology — to name only a few. The number of openings under the Conventional Projection in the most directly relevant occupations (economist, political scientist, sociologist, urban and

regional planners and college teacher in the social sciences) ranges from 2,100 to *2,700* — far below the number of market ready graduates. Obviously some social science majors will have to seek employment in occupations not directly related to their fields of study. This means that they will be competing with graduates who have technical or specialized skills for jobs in the private and public job market. In the 1960's, when there were not enough college graduates available to meet the needs for professional-technical-managerial occupations, social science majors found suitable accommodations in the job market. This has become increasingly difficult during the early 1970's and will become an even more serious problem for the remainder of the decade.

### The Non-Classified Openings

The foregoing assessments for graduates in specific academic fields place initial emphasis on openings in the traditionally recognized professional-technical-managerial occupations. For some fields it was possible to identify certain other occupations under the Comprehensive Projection that are sufficiently related to various fields of study to warrant identification as additional employment opportunities. Thus, for example, it was pointed out above that openings for welfare service aides (encompassing a wide sub-classification of occupational titles) would present additional opportunities for psychology majors besides the traditional ones of pyschologists or counselors. It is impossble to itemize the wide scope of such additional possibilities for each field of study. The variety of the 421 occupations in the Comprehensive Projection and the relevance of each to specific fields of study are too complex to permit this type of "matching." It should be noted, however, that of the 421 occupations included in Comprehensive Projection, 285 are the non-classified ones in which less than 15 percent of the workers in 1970 had college degrees. The total number of openings projected to be filled by college graduates in these 285 occupations is almost *50,000*. Although these openings will "take up the slack" for graduates in many academic fields shown to be in surplus under the Conventional Projection, it is impossible to pinpoint how these openings may be distributed among these fields of study.

### Supply/Demand Findings by States

For most states the comparison of market-ready degree projections with the projected openings yields results similar to those found for the region. As shown in Table III and Figure 4, when degrees are compared to openings in the professional-technical-managerial occupations covered by the Conventional Projection, only three states (Florida, Maryland and Virginia) have a deficit of total supply relative to demand. The other states show a surplus of college educated entrants into the labor market relative to the "traditional" jobs for graduates. The surplus in the 11 states offsets the deficit in the three states by a margin of 23,000 graduates.

When all occupations are considered as possible opportunities for employment of college graduates under the Comprehensive Projection, then eight states have a deficit of graduates relative to total openings. However, Alabama, Kentucky, Louisiana, Mississippi, Tennessee and West Virginia have a surplus of college graduates even when openings are considered across the entire range of 421 occupations projected to be filled by graduates in each of these states. The deficit in the eight states is larger than the surplus in the remaining six states, so that with enough migration of college graduates across state lines, the surpluses will disappear. Indeed, if such migration does occur in response to extra openings in the "importing" states, there would still be a deficit close to 32,000 in the latter states.

Individual state comparisons of projected occupational openings and market-ready graduates by academic fields of study are being prepared, and will be available through later publications of the SREB Manpower and Education project.

**Table III**

**Supply/Demand Comparisons for College Graduates (All Degree Levels), by State, 1980**

| State | Market-Ready Degrees | Occupational Openings | | Surplus or (Deficit) | |
|---|---|---|---|---|---|
| | | Comprehensive Projection | Conventional Projection | Comprehensive Projection | Conventional Projection |
| Alabama | 15,050 | 13,900 | 11,900 | 1,150 | 3,150 |
| Arkansas | 8,000 | 9,400 | 5,900 | (1,400) | 2,100 |
| Florida | 28,450 | 36,300 | 33,600 | (7,850) | (5,150) |
| Georgia | 18,700 | 22,700 | 18,200 | (4,000) | 500 |
| Kentucky | 15,100 | 13,000 | 11,700 | 2,100 | 3,400 |
| Louisiana | 17,650 | 15,200 | 15,500 | 2,450 | 2,150 |
| Maryland | 15,900 | 25,800 | 17,700 | (9,900) | (1,800) |
| Mississippi | 10,600 | 10,000 | 7,000 | 600 | 3,600 |
| North Carolina | 22,200 | 23,300 | 20,000 | (1,100) | 2,200 |
| South Carolina | 9,650 | 11,600 | 9,100 | (1,950) | 550 |
| Tennessee | 19,950 | 17,500 | 15,300 | 2,450 | 4,650 |
| Texas | 52,700 | 59,300 | 46,500 | (6,600) | 6,200 |
| Virginia | 16,150 | 26,800 | 18,300 | (10,650) | (2,150) |
| West Virginia | 8,600 | 5,700 | 4,800 | 2,900 | 3,800 |
| **Region*** | **258,700** | **290,500** | **235,500** | **(31,800)** | **23,200** |

*Regional totals vary slightly from totals in Table I because of rounding.

Figure 4

**MARKET-READY COLLEGE GRADUATES SURPLUS or DEFICIT in the SOUTHERN STATES, 1980**

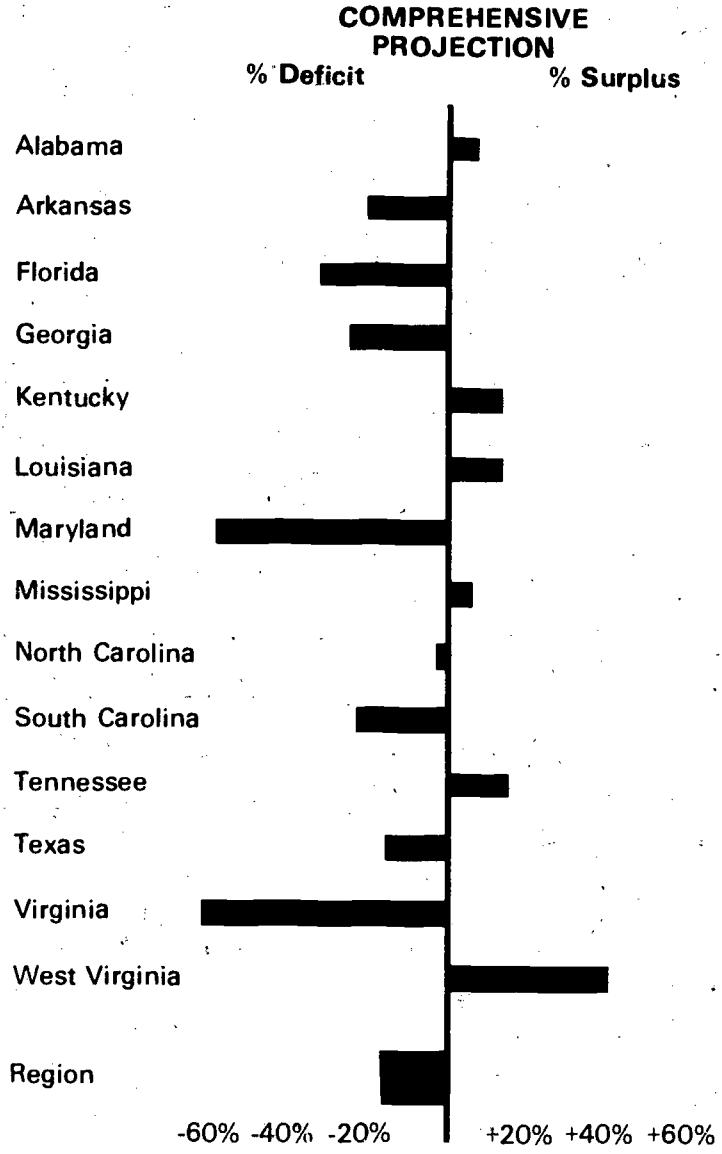
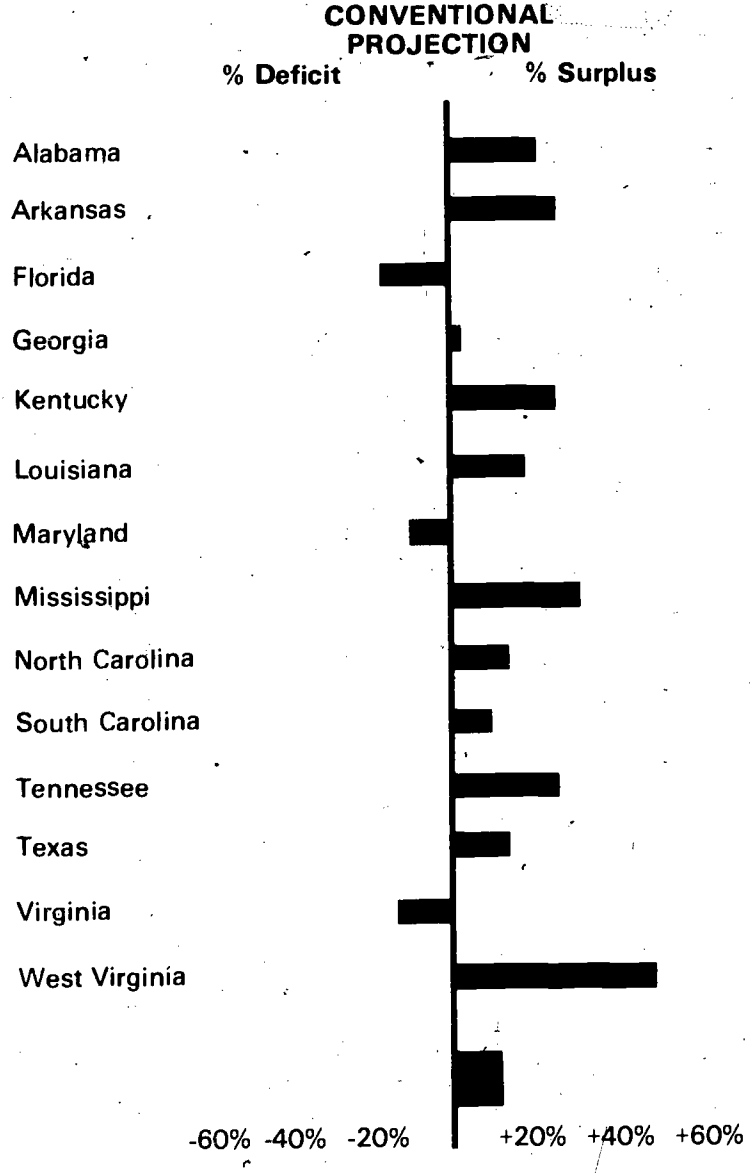


Figure 4 — Continued

Market-Ready College Graduates Surplus or Deficit in the Southern States, 1980



# III. Implications and Conclusions

## Manpower Planning

Manpower planning recognizes that the value of an education transcends the need for college training as preparation for labor force entry. There are many values besides career training and besides preparing productive workers for jobs that might be performed more effectively if filled by college graduates. Manpower planning not only accepts, but fully agrees with the philosophy that higher education fulfills humanistic and cultural goals of society by enriching each individual's life. Manpower-educational planning strategies also fully recognize that college education serves as the great engine of upward mobility in a democratic society; in doing so, colleges may produce more college graduates than the labor market requires and yet be performing a necessary function in our society.

Notwithstanding the acceptance of these non-economic aspects of the need for higher education, there will always be the question as to how much of society's resources should be devoted to the education of its citizens. After accepting the principle that the benefits of education accrue beyond the economic world, policymakers will consider what benefits accrue from education in an economic sense.

The job market is changeable, and the "upgrading" process through the years has been characterized by more and more occupations being filled with college graduates. In many instances this means that occupations entail work done more productively by college educated persons than by non-degree holders, so that the "upgrading" process reaps economic benefits. In other instances it means that there are enough college educated persons in the labor market to spill over into more and more occupations. It is hard to define how much productivity in various occupations is increased because of being filled by more educated persons. The two projections used in this report allow educational policymakers elbow room. Those who question the need for a college education across 421 occupations and are concerned about underutilization of educated workers in repetitive jobs will tend to favor the results obtained by the Conventional Projection. Those who lean to the philosophy that continuing upgrading of occupations tends to improve economic productivity will prefer to favor the results obtained in the Comprehensive Projection.

## Conclusions

The Conventional Projection according to both data sources indicates an oversupply of college educated workers during the 1970's for openings in the sphere of professional-technical-managerial jobs. This oversupply ranges from seven to nine percent of available graduates.

Against this oversupply there will be additional competition from college educated workers who reenter the labor market, and who have not been included in this analysis.

When the upgrading process is extended to the entire range of 421 occupations (the Comprehensive Projection), the oversupply disappears and turns into a deficit of college educated workers. This indicates that if enough college graduates are interested in opportunities outside of the traditional professional-technical-managerial jobs, they will find employment.

The supply/demand comparisons for individual fields of study indicate that health, engineering, accounting, computer science and business administration majors will find a favorable labor market. Education and law school graduates will find a saturated market. Humanities and social science majors will experience difficulty if they are seeking jobs that specifically relate to their educational preparation. If, on the other hand, they come with skills that can readily be applied in the wide scope of occupations in the business world, their outlook is brighter.

The projections suggest that for the region as a whole, educational and training funding priorities should be maintained at high levels for business, engineering and most health fields. From a manpower perspective, new schools of law appear unwarranted. The findings for some individual states differ markedly from the region's. Florida, Maryland and Virginia have a deficit of college graduates under both projections. As was true in past years, the deficits in some states will be accommodated by the inmigration of the surplus in other states, as graduates move to where the jobs are. More detailed information on field-by-field state surpluses and deficits is planned for later reports by the SREB Manpower and Education project.

# IV. Technical Methodological Notes and Reservations

As stated earlier, two data sources were used to develop average annual openings in each occupation. The National Planning Association's projections of 1980 employment by industry in each of the 14 Southern states were used. Employment by industries was then translated into employment projections by occupations, according to the methods developed by the U.S. Bureau of Labor Statistics in its series, *Tomorrow's Manpower Needs*.[8] An occupational matrix for each state describes the percentage of employment in each industry accounted for by each of the 421 occupations within industries during the 1970-80 decade to construct corresponding 1970 and 1980 occupation by industry tables.

Applying these matrices to projected employment in each industry permits summation of occupational employment across industries, and a calculation of new workers in each occupation in 1980, relative to 1970. Additionally, replacement rates are applied for each occupation to yield demand generated by retirement, death, and other separations from the labor force. The final result produces total average annual occupational openings for the 1970-80 period.

For the Conventional Projection (covering 136 occupations) two sets of data are used. In addition to the average annual occupational openings developed through the NPA data as described above, projections developed by the Departments of Employment Security (DES) in each of the 14 Southern states were aggregated. The states, in developing their DES projections, also used the method developed by the Bureau of Labor Statistics.[9] Total employment for the region as projected by the DES shows a 25.3 percent increase over 1970, while total employment according to NPA shows a 21.4 percent increase.

Although the DES projections are more optimistic for *total* employment than are the NPA ones, the DES data yield fewer openings for the 136 occupations of the Conventional Projection to be filled by college graduates than do the NPA data. The total regional difference between the two sets of data on openings for college graduates in the Conventional Projection is 5,100. This small difference reflects more modest growth rate assumptions by the state Departments of Employment Security for industries with heavy emphasis on professional-technical-managerial occupations than are postulated by NPA.

### Reservations on Interpretation of Findings

Certain reservations about the findings should be mentioned which result because of the limitations in presently available data. Returning workers who reenter the labor market after an absence present additional competition and may affect the findings. They would be particu-

larly important in fields such as nursing and education, where many women temporarily retire from their professions and reenter the labor market at a later time.

Also excluded from both the supply and demand components is the possible influence of occupational mobility of workers, or the transfers of employed persons between jobs. Exploratory work is currently being conducted on these factors by the Bureau of Labor Statistics and additional information may be available for later revision of the projections in this report.[10]

The demand projections might be slightly affected if instead of having projected educational attainment levels for 1980 on the basis of the *U.S. average* in each occupation, the projection had been made on the basis of *each state's* educational attainment patterns. In 1970 the proportion of the population with four years of college was almost the same in the region as for the nation. The proportion with five or more years of college was substantially lower for the region relative to the nation. For some individual Southern states, however, educational attainment levels were considerably below the national and regional averages. The state projections of occupational demand therefore might be affected if more precise data had been available on state occupational attainment levels.[11]

As noted earlier, the proportion of openings in each occupation projected to be filled by college graduates was determined by extending the 1960-70 trend of changes in educational attainment. This method yields percentages in some occupations that may be too low. For example according to this method, only 76 percent of openings for architects and 67 percent for civil engineers are to be filled by college graduates in 1980. These proportions may be unduly conservative in light of present labor market conditions. If so, more openings would be available in 1980 in certain occupations than projected in this report.

On the supply side, the year used in the projection of degrees is 1980, whereas the demand projections deal with average annual openings for the entire decade. Adjusting the supply side downward to account for the different time periods is estimated to reduce supply by approximately seven percent. Also in recent years the annual projections of degrees by the U.S. Office of Education indicate substantial downward revision for the 1970's. For example, the 1973 projections of bachelor's degrees to be awarded in 1980 are only 84 percent of the number projected in the 1972 release for 1980.[12] Further reductions in subsequent years would also act to reduce noticeably the projected oversupplies shown in this report.

The analysis to date has not included any college students with less than four years of higher education. For an exhaustive treatment of the supply/demand outlook relative to college educated workers it is obvious that students entering the labor market from junior colleges and other higher education programs would need to be included. Unfortunately the data available on students with less than a bachelor's degree are presently incompatible with the anaiytical requirements for comparison with occupational openings.

## NOTES

1. E.F. Schietinger, *Degree Output in the South, 1971-72* (Atlanta, Georgia; The Southern Regional Education Board, 1975); the U.S. Office of Education, *Earned Degrees Conferred: 1970-71* (Washington, D.C.: U.S. Government Printing Office, 1973); and the U.S. Office of Education, *Projections of Educational Statistics to 1982-83* (Washington, D.C.: U.S. Government Printing Office, 1974).

2. An alternative projection of the distribution of degrees by field of study which assumes a greater decline in the proportion of education majors from 1971 to 1980 than the one used in this report, and various other minor distributional differences, is available. It was not used, however, in this report because recent data did not confirm the severity of the decline in the proportion of students choosing education as a field of study.

3. These projections are part of a cooperative research program involving the U.S. Bureau of Labor Statistics (BLS) and the research unit of each state employment security agency. The program was initiated in the early 1970's and is a continuing effort involving the projection of occupational demand for individual states with periodic revision as new data permit. Each state assembles and evaluates data, with additional data work and computer applications carried out by BLS or its designate. DES demand figures were obtained by special release from each state, individually, at a time when many of the agencies had only recently received the results from BLS and were examining the findings in detailed critical review. Although major revisions should not be anticipated, the materials were provided as preliminary working data subject to subsequent alteration by the respective agencies.

4. Joe Won Lee and William B.D. Hong, *Regional Economic Projections: 1960-85* (Washington, D.C.: The National Planning Association, Report No. 73-R-1, December 1973).

5. Arthur H. Padilla, *The Market for Teachers in the Nation and the Southern Region,* Southern Regional Education Board, Atlanta, 1975. Other fields on which the Southern Regional Education Board has published recent special manpower assessments include law, engineering, and public adminstration. Additional studies are underway in home economics, social work, and business administration.

6. U.S. Department of Labor, "What's Happening to Jobs in the Library Field," in *Occupational Outlook Quarterly,* Winter 1974, pp. 20-25.

7. Table 32 of unpublished Bureau of Labor Statistics tabulations from the October 1972 Current Population Survey. See also, Bureau of Social Science Research, Inc., *Two Years After the College Degree* (Washington, D.C.: U.S. Government Printing Office, 1973).

8 U.S. Department of Labor, Bureau of Labor Statistics, *Tomorrow's Manpower Needs,* Volumes one through four and supplements (Washington, D.C.: U.S. Government Printing Office, 1969-74).

9 The Florida and Mississippi DES projections excluded some occupations for which the Manpower and Education project estimated values on the basis of data from similar states.

10 Working Group on Manpower Projections (1967), "Report of the Working Group," U.S. Department of Labor (Washington, D.C.: U.S. Government Printing Office).

11 U.S. Bureau of the Census, Census of Population: 1970, *General and Social Economic Characteristics,* , Final Report PC(1)-C for Southern states, (Washington, D.C.: U.S. Government Printing Office, 1972), Table 46.

12 U.S. Office of Education, *Projections of Educational Statistics to 1982-83 (Washington, D.C.: U.S. Government Printing Office, 1974), p. 46.*

# Appendixes

## Appendix 1

### Percentage Distribution of Degrees by Fields of Study, 1980 — SREB Region

| | Bachelor's | | Master's | |
|---|---|---|---|---|
| | 1971 | 1980 | 1971 | 1980 |
| Agriculture | 1.7% | 2.0% | 1.4% | 1.4% |
| Architecture and Design | .6 | .6 | .5 | .5 |
| Biological Sciences | 4.1 | 4.6 | 3.0 | 3.1 |
| Business and Management | 17.3 | 17.3 | 9.0 | 10.1 |
| Communications | 1.3 | 2.0 | .5 | .3 |
| Computer and Info. Sciences | .2 | .24 | .4 | .6 |
| Education | 24.2 | 18.4 | 44.7 | 48.5 |
| Engineering | 5.4 | 4.7 | 6.2 | 5.3 |
| Fine and Applied Arts | 2.7 | 3.3 | 1.9 | 1.6 |
| Foreign Languages | 1.7 | 1.4 | 1.6 | 1.0 |
| Health Professions | 2.8 | 4.5 | 2.9 | 3.6 |
| Letters | 7.4 | 6.2 | 5.2 | 3.7 |
| Library Science | .2 | .2 | 3.1 | 2.8 |
| Mathematics | 3.1 | 3.1 | 2.2 | 1.8 |
| Physical Sciences | 2.3 | 2.0 | 2.6 | 2.3 |
| Psychology | 3.7 | 5.9 | 2.0 | 2.1 |
| Public Affairs and Services | .9 | 3.0 | 3.0 | 3.1 |
| Social Sciences and Area Studies | 16.9 | 16.9 | 6.5 | 5.2 |
| Other | 3.3 | 3.7 | 3.3 | 3.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

## Appendix 2

### Market-Ready Supply by Fields of Study, All Degree Levels* Southern Region, 1980

| | |
|---|---|
| Accounting | 6,700 |
| Agriculture and Natural Resources | 4,700 |
| Architecture and Design | 1,400 |
| Biological Sciences | 8,700 |
| Business and Management (excluding Accounting) | 34,100 |
| Communications | 4,200 |
| Computer & Information Sciences | 1,100 |
| Education | 67,600 |
| Engineering | 11,800 |
| Fine and Applied Arts | 6,800 |
| Foreign Languages | 2,800 |
| Health Professions | 11,300 |
| Letters | 12,100 |
| Library Sciences | 1,500 |
| Mathematics and Statistics | 6,000 |
| Physical Sciences | 4,500 |
| Psychology | 11,500 |
| Public Affairs | 6,500 |
| Social Science and Area Studies | 30,000 |
| Other | 9,500 |
| Total | 242,700 |

* Except first professional degrees

## Appendix 3

## Alternative Projections of Demand, Workers With Four Years of College, by Occupation, SREB Regional Average Annual Demand 1970-1980

| | Occupational Openings | |
|---|---|---|
| | Low | High |
| Accountants | 5,478 | 6,696 |
| Architects | 945 | 1,026 |
| Computer Programmers | 1,401 | 1,579 |
| Computer Systems Analysts | 1,075 | 1,480 |
| Other Computer Specialists | 131 | 133 |
| Aeronautical and Astronautical Engineers | 540 | 542 |
| Chemical Engineers | 408 | 495 |
| Civil Engineers | 1,925 | 1,962 |
| Electrical and Electronic Engineers | 2,785 | 2,815 |
| Industrial Engineers | 1,488 | 1,691 |
| Mechanical Engineers | 1,191 | 1,262 |
| Metallurgical and Materials Engineers | 110 | 127 |
| Mining Engineers | 16 | 24 |
| Petroleum Engineers | 132 | 168 |
| Sales Engineers | 255 | 296 |
| Other Engineers | 1,774 | 2,211 |
| Farm Management Advisors | 46 | 72 |
| Foresters and Conservationists | 440 | 736 |
| Home Management Advisors | 104 | 202 |
| Judges | 216 | 263 |
| Lawyers | 4,588 | 4,766 |
| Librarians | 2,412 | 2,637 |
| Archivists and Curators | 75 | 93 |
| Actuaries | 43 | 54 |
| Mathematicians | 200 | 260 |
| Statisticians | 351 | 778 |
| Agricultural Scientists | 95 | 134 |
| Atmospheric and Space Scientists | 73 | 106 |
| Biological Scientists | 383 | 660 |
| Chemists | 1,015 | 1,172 |
| Geologists | 346 | 368 |
| Marine Scientists | 79 | 106 |
| Physicists and Astronomers | 168 | 266 |
| Other Life and Physical Scientists | 14 | 17 |
| Operations and Systems Researchers and Analysts | 860 | 991 |
| Personnel and Labor Relations Workers | 2,606 | 3,040 |
| Chiropractors | 193 | 257 |
| Dentists | 1,488 | 1,569 |
| Optometrists | 232 | 290 |
| Pharmacists | 1,588 | 1,687 |
| Physicians, Medical and Osteopathic | 4,052 | 5,549 |
| Podiatrists | 49 | 55 |
| Veterinarians | 737 | 843 |
| Other Health Practitioners | 9 | 26 |
| Dietitians | 480 | 596 |
| Registered Nurses | 4,200 | 5,386 |
| Therapists | 1,488 | 2,005 |
| Clinical Laboratory Technologists and Technicians | 2,069 | 2,487 |
| Dental Hygienists | 244 | 252 |
| Health Record Technologists and Technicians | 270 | 293 |
| Radiologic Technologists and Technicians | | 131 |
| Therapy Assistants | 23 | 28 |
| Other Health Technologists and Technicians | 609 | 834 |
| Clergymen | 3,527 | 5,277 |
| Other Religious Workers | 509 | 544 |
| Economists | 1,041 | 1,183 |
| Political Scientists | 37 | 41 |
| Psychologists | 625 | 756 |
| Sociologists | 24 | 39 |
| Urban and Regional Planners | 224 | 299 |
| Other Social Scientists | 113 | 230 |
| Social Workers | 3,600 | 4,879 |
| Recreation Workers | 271 | 339 |
| Agriculture Teachers | 30 | 68 |
| Atmospheric, Earth, Marine, and Space Teachers | 54 | 85 |
| Biology Teachers | 408 | 553 |
| Chemistry Teachers | 98 | 174 |
| Physics Teachers | | 60 |
| Engineering Teachers | 87 | 175 |
| Mathematics Teachers | 379 | 559 |
| Health Specialties Teachers | 827 | 1,034 |
| Psychology Teachers | 286 | 370 |
| Business and Commerce Teachers | 355 | 446 |
| Economics Teachers | 118 | 184 |
| History Teachers | 95 | 186 |
| Sociology Teachers | 211 | 274 |
| Other Social Science Teachers | 223 | 307 |
| Art, Drama, and Music Teachers | 526 | 683 |
| Coaches and Physical Education Teachers | 149 | 237 |
| Education Teachers | 74 | 127 |
| English Teachers | 483 | 688 |
| Foreign Language Teachers | 413 | 525 |
| Home Economics Teachers | 88 | 147 |
| Law Teachers | 64 | 95 |
| Theology Teachers | 128 | 159 |

| | | |
|---|---|---|
| Trade, Industrial, and Technical Teachers | 51 | 72 |
| Miscellaneous Teachers, College and University | 372 | 491 |
| Teachers, College and University, subject not specified | 2,689 | 3,290 |
| Adult Education Teachers | 579 | 1,030 |
| Elementary School Teachers | 32,895 | 33,867 |
| Prekindergarten and Kindergarten Teachers | 1,120 | 1,169 |
| Secondary School Teachers | 14,110 | 14,237 |
| Other Teachers, except College and University | 489 | 1,102 |
| Agriculture and Biological Technicians, except Health | • | 117 |
| Chemical Technicians | 227 | 271 |
| Draftsmen | • | 308 |
| Electrical and Electronic Engineering Technicians | • | 243 |
| Industrial Engineering Technicians | • | 11 |
| Mechanical Engineering Technicians | • | 27 |
| Mathematical Technicians | 2 | 6 |
| Surveyors | • | 90 |
| Other Engineering and Science Technicians | • | 679 |
| Airplane Pilots | 486 | 556 |
| Air Traffic Controllers | * | 37 |
| Embalmers | 15 | 16 |
| Flight Engineers | 60 | 70 |
| Radio Operators | • | 16 |
| Tool Programmers, Numerical Control | 11 | 15 |
| Other Technicians | • | 165 |
| Vocational and Educational Counselors | 2,895 | 3,138 |
| Actors | 17 | 29 |
| Athletes and Kindred Workers | 369 | 401 |
| Authors | 171 | 252 |
| Dancers | • | 12 |
| Designers | 514 | 517 |
| Editors and Reporters | 1,505 | 1,812 |
| Musicians and Composers | 12 | 25 |
| Painters and Sculptors | 299 | 354 |
| Photographers | • | 98 |
| Public Relations Men and Publicity Writers | 616 | 733 |
| Radio and Television Announcers | 57 | 62 |
| Other Writers, Artists, and Entertainers | 444 | 532 |
| Research Workers, subject not specified | 1,646 | 2,360 |
| Assessors, Controllers; Local Public Administration | • | 120 |
| Bank Officers and Financial Managers | 3,465 | 4,472 |
| Buyers, and Shippers, Farm Products | • | 20 |
| Buyers, Wholesale and Retail Trade | 695 | 783 |
| Credit Men | 231 | 306 |
| Funeral Directors | • | 157 |
| Health Administrators | 1,215 | 1,475 |
| Construction Inspectors; Public Administration | • | 38 |
| Inspectors, Except Construction, Public Administration | 400 | 530 |
| Managers and Superintendents, Building | • | 1,053 |
| Other Office Managers | 3,060 | 3,220 |
| Officers, Pilots, and Pursers, Ship | • | 146 |
| Other Officials and Administrators, Public Administration | 2,397 | 2,912 |
| Officials of Lodges, Societies, and Unions | 634 | 638 |
| Postmasters and Mail Superintendents | • | 85 |
| Other Purchasing Agents and Buyers | 778 | 801 |
| Railroad Conductors | • | 6 |
| Restaurant, Cafeteria, and Bar Managers | • | 841 |
| Sales Managers and Department Heads, Retail Trade | • | 1,702 |
| Sales Managers, except Retail Trade | 3,628 | 3,959 |
| School Administrators, College | 733 | 1,039 |
| School Administrators, Elementary and Secondary | 3,252 | 3,540 |
| Other Managers and Administrators | 57,604 | 61,472 |
| Advertising Agents and Salesmen | 415 | 2,561 |
| Auctioneers | • | 2 |
| Demonstrators | • | 81 |
| Hucksters and Peddlers | • | 248 |
| Insurance Agents, Brokers, and Underwriters | 2,242 | 2,345 |
| Newsboys | • | 110 |
| Real Estate Agents and Brokers | 2,011 | 2,352 |
| Stock and Bond Salesmen | 941 | 1,079 |
| Sales Representatives, Manufacturing Industries | 2,529 | 5,300 |
| Sales Representatives, Wholesale Trade | 2,484 | 2,560 |
| Sales Clerks, Retail Trade | • | 2,685 |

| | | |
|---|---|---|
| Salesmen, Retail Trade | • | 1,739 |
| Salesmen of Services and Construction | • | 2,915 |
| Bank Tellers | • | 121 |
| Billing Clerks | • | 143 |
| Bookkeepers | • | 3,215 |
| Cashiers | • | 309 |
| Clerical Assistants, Social Welfare | 24 | 38 |
| Other Clerical Supervisors | 1,263 | 1,532 |
| Collectors, Bill and Account | • | 119 |
| Counter Clerks, Except Food | • | 264 |
| Dispatchers and Starters, Vehicle | • | 61 |
| Enumerators and Investigators | • | 211 |
| Other Estimators and Investigators | 1,275 | 1,456 |
| Expediters and Production Controllers | • | 274 |
| File Clerks | • | 491 |
| Insurance Adjusters, Examiners, and Investigators | 498 | 573 |
| Library Attendants and Assistants | 603 | 735 |
| Mail Carriers, Post Office | • | 89 |
| Mail Handlers, except Post Office | • | 208 |
| Messengers and Office Boys | • | 51 |
| Meter Readers, Utilities | • | 5 |
| Bookkeeping and Billing Machine Operators | • | 35 |
| Calculating Machine Operators | • | 10 |
| Computer and Peripheral Equipment Operators | • | 189 |
| Duplicating Machine Operators | • | 16 |
| Key Punch Operators | • | 78 |
| Tabulating Machine Operators | • | 0 |
| Other Office Machine Operators | • | 28 |
| Payroll and Timekeeping Clerks | • | 102 |
| Postal Clerks | • | 43 |
| Proofreaders | • | 138 |
| Real Estate Appraisers | 231 | 241 |
| Receptionists | • | 447 |
| Secretaries, Legal | • | 136 |
| Secretaries, Medical | • | 118 |
| Other Secretaries | • | 4,091 |
| Shipping and Receiving Clerks | • | 237 |
| Statistical Clerks | • | 409 |
| Stenographers | • | 45 |
| Stock Clerks and Storekeepers | • | 494 |
| Teacher Aides, except School Monitors | • | 337 |
| Telegraph Operators | • | 25 |
| Telephone Operators | • | 153 |
| Ticket Station and Express Agents | • | 153 |
| Typists | • | 975 |
| Weighers | • | 19 |
| Miscellaneous and Not Specified Clerical Workers | • | 4,343 |
| Automobile Accessories Installers | • | 3 |
| Bakers | • | 6 |
| Blacksmiths | • | 5 |
| Boilermakers | • | 21 |
| Bookbinders | • | 3 |
| Brickmasons and Stonemasons | • | 29 |
| Brickmason and Stonemason Apprentices | • | 1 |
| Bulldozer Operators | • | 63 |
| Cabinetmakers | • | 48 |
| Carpenters | • | 352 |
| Carpenter Apprentices | • | 0 |
| Carpet Installers | • | 29 |
| Cement and Concrete Finishers | • | 85 |
| Compositors and Typesetters | • | 28 |
| Printing Trades Apprentices, except Pressmen | • | 49 |
| Cranemen, Derrickmen, and Hoistmen | • | 10 |
| Decorators and Window Dressers | • | 148 |
| Dental Laboratory Technicians | • | 40 |
| Electricians | • | 165 |
| Electrician Apprentices | • | 2 |
| Electric Power Linemen and Cablemen | • | 3 |
| Electrotypers and Stereotypers | • | 3 |
| Engravers, except Photoengravers | • | 7 |
| Excavating, Grading, and Road Machine Operators | • | 24 |
| Floor Layers, except Tile Setters | • | 3 |
| Other Foremen | • | 2,433 |
| Forgemen and Hammermen | • | 0 |
| Furniture and Wood Finishers | • | 6 |
| Furriers | • | 0 |
| Glaziers | • | 47 |
| Heat Treaters, Annealers, Temperers | • | 0 |
| Inspectors, Scalers, and Graders; Log and Lumber | • | 3 |
| Other Inspectors | • | 101 |
| Jewelers and Watchmakers | • | 53 |
| Job and Die Setters, Metal | • | 9 |
| Locomotive Engineers | • | 2 |
| Locomotive Firemen | • | 44 |
| Machinists | • | 49 |
| Machinist Apprentices | • | 0 |
| Air Conditioning, Heating, and Refrigeration | • | 100 |
| Aircraft | • | 57 |

| | |
|---|---|
| Automobile Body Repairmen | 5 |
| Automobile Mechanics | 195 |
| Automobile Mechanic Apprentices | 0 |
| Data Processing Machine Repairmen | 51 |
| Farm Implement | 21 |
| Heavy Equipment Mechanics, Including Diesel | 95 |
| Household Appliance and Accessory Installers and Mechanics | 44 |
| Loom Fixers | 0 |
| Office Machine | 4 |
| Radio and Television | 21 |
| Railroad and Car Shop | 2 |
| Mechanic Apprentices, except Auto | 0 |
| Miscellaneous and Not Specified Mechanic | 369 |
| Millers, Grain, Flour, and Feed | 3 |
| Millwrights | 18 |
| Molders, Metal | 4 |
| Molder Apprentices | 0 |
| Motion Picture Projectionists | 17 |
| Opticians, and Lens Grinders and Polishers | 17 |
| Painters, Construction and Maintenance | 91 |
| Painter Apprentices | 0 |
| Paperhangers | 78 |
| Pattern and Model Makers, except Paper | 4 |
| Photoengravers and Lithographers | 8 |
| Piano and Organ Tuners and Repairmen | 22 |
| Plasterers | 3 |
| Plasterer Apprentices | 0 |
| Plumbers and Pipe Fitters | 229 |
| Plumber and Pipe Fitter Apprentices | 0 |
| Power Station Operators | 2 |
| Pressmen and Plate Printers, Printing | 32 |
| Pressmen Apprentices | 0 |
| Rollers and Finishers, Metal | 3 |
| Roofers and Slaters | 53 |
| Sheetmetal Workers and Tinsmiths | 12 |
| Sheetmetal Apprentices | 0 |
| Shipfitters | 2 |
| Shoe Repairmen | 4 |
| Sign Painters and Letterers | 6 |
| Stationary Engineers | 127 |
| Stone Cutters and Stone Carvers | 3 |
| Structural Metal Craftsmen | 23 |
| Tailors | 19 |
| Telephone Installers and Repairmen | 24 |
| Telephone Linemen and Splicers | 2 |
| Tile Setters | 2 |
| Tool and Die Makers | 18 |
| Tool and Die Maker Apprentices | 0 |
| Upholsterers | 12 |
| Other Specified Craft Apprentices | 0 |
| Other Craftsmen and Kindred Workers | 20 |
| Former Members of the Armed Forces | 1 |
| Asbestos and Insulation Workers | 4 |
| Assemblers | 141 |
| Blasters and Powdermen | 0 |
| Bottling and Canning Operatives | 1 |
| Chainmen, Rodmen, and Axmen; Surveying | 58 |
| Checkers, Examiners, and Inspectors, Manufacturing | 249 |
| Clothing Ironers and Pressers | 6 |
| Other Cutting Operatives | 13 |
| Dressmakers and Seamstresses, except Factory | 66 |
| Drillers, Earth | 0 |
| Dry Wall Installers and Lathers | 5 |
| Dryers | 3 |
| Filers, Polishers, Sanders, and Buffers | 11 |
| Furnacemen, Smeltermen, and Pourers | 29 |
| Garage Workers and Gas Station Attendants | 735 |
| Graders and Sorters, Manufacturing | 3 |
| Produce Graders and Packers, except Factory and Farm | 23 |
| Heaters, Metal | 0 |
| Other Laundry and Dry Cleaning Operatives | 88 |
| Meat Cutters and Butchers, except Manufacturing | 27 |
| Meat Cutters and Butchers, Manufacturing | 12 |
| Meat Wrappers, Retail Trade | 1 |
| Metal Platers | 1 |
| Milliners | 0 |
| Other Mine Operatives | 87 |
| Mixing Operatives | 3 |

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|---|---|
| Oilers and Greasers, except Auto | 1 |
| Packers and Wrappers, except Meat and Produce | 176 |
| Painters, Manufactured Articles | 10 |
| Photographic Process Workers | 87 |
| Drill Press Operatives | 1 |
| Grinding Machine Operatives | 3 |
| Lathe and Milling Machine Operatives | 3 |
| Other Precision Machine Operatives | 2 |
| Punch and Stamping Press Operatives | 3 |
| Riveters and Fasteners | 1 |
| Sailors and Deckhands | 111 |
| Sawyers | 64 |
| Sewers and Stitchers | 206 |
| Shoemaking Machine Operators | 0 |
| Solderers | 1 |
| Stationary Firemen | 20 |
| Carding, Lapping, and Combing Operatives | 0 |
| Knitters, Loopers, and Toppers | 33 |
| Spinners, Twisters, and Winders | 10 |
| Weavers | 25 |
| Other Textile Operatives | 11 |
| Welders and Flame-cutters | 82 |
| Other Winding Operatives | 2 |
| Machine Operatives, miscellaneous and not specified | 135 |
| Miscellaneous and Not Specified Operatives | 411 |
| Boatmen and Canalmen | 9 |
| Bus Divers | 115 |
| Conductors and Motormen, Urban Rail Transit | 0 |
| Deliverymen and Routemen | 74 |
| Fork Lift and Tow Motor Operatives | 6 |
| Motormen, Mine, Factory, Logging Camp, etc. | 0 |
| Parking Attendants | 73 |
| Railroad Brakemen | 24 |
| Railroad Switchmen | 24 |
| Taxicab Drivers and Chauffeurs | 192 |
| Truck Drivers | 373 |
| Animal Caretakers, except Farm | 324 |
| Carpenters Helpers | 40 |
| Construction Laborers, except Carpenters | 35 |
| Fishermen and Oystermen | 81 |
| Freight and Material Handlers | 44 |
| Garbage Collectors | 16 |
| Gardeners and Groundskeepers, except Farm | 235 |
| Longshoremen and Stevedores | 27 |
| Lumbermen, Raftsmen, and Woodchoppers | 34 |
| Stock Handlers | 36 |
| Teamsters | 1 |
| Vehicle Washers and Equipment Cleaners | 30 |
| Other Warehousemen | 13 |
| Miscellaneous and Not Specified Laborers | 189 |
| Farmers (Owners and Tenants) | 841 |
| Farm Managers | 256 |
| Farm Foremen | 80 |
| Farm Laborers, Wage Workers | 295 |
| Farm Laborers, Unpaid Family Workers | 27 |
| Farm Service Laborers, Self-employed | 38 |
| Chambermaids and Maids, except Private Household | 92 |
| Cleaners and Charwomen | 171 |
| Janitors and Sextons | 468 |
| Bartenders | 109 |
| Busboys | 3 |
| Cooks, except Private Household | 124 |
| Dishwashers | 14 |
| Food Counter and Fountain Workers | 15 |
| Waiters | 496 |
| Other Food Service Workers, except Private Household | 77 |
| Dental Assistants | 40 |
| Health Aides, except Nursing | 428 |
| Health Trainees | 10 |
| Lay Midwives | 1 |
| Nursing Aides, Orderlies, and Attendants | 278 |
| Practical Nurses | 83 |
| Airline Stewardesses | 440 549 |
| Attendants, Recreation and Amusement | 150 |
| Other Attendants, Personal Service | 123 |
| Baggage Porters and Bellhops | 3 |
| Barbers | 37 |
| Boarding and Lodging Housekeepers | 10 |
| Bootblacks | 2 |
| Child Care Workers, except Private Household | 666 |
| Elevator Operators | 1 |
| Hairdressers and Cosmetologists | 67 |

| | | | |
|---|---|---|---|
| Personal Service Apprentices | 0 | Guards and Watchmen | 538 |
| Housekeepers, except Private Household | 447 | Marshals and Constables | 37 |
| School Monitors | 19 | Policemen and Detectives | 633 |
| Ushers, Recreation and Amusement | 4 | Sheriffs and Bailiffs | 32 |
| Welfare Service Aides | 139 | Child Care Workers, Private Household | 179 |
| Crossing Guards and Bridge Tenders | 4 | Cooks, Private Household | 20 |
| Firemen, Fire Protection | 61 | Housekeepers, Private Household | 33 |
| | | Laundresses, Private Household | 116 |
| | | Maids and Servants, Private Household | 214 |

*Not projected from DES data for occupations excluded from the Conventional Projection.

## Appendix 4

## Occupations Included in Supply-Demand Comparisons, Table II

| Occupations | Academic Field of Study |
|---|---|
| **Health Professions** | |
| Dentists | Dentistry |
| Dental Hygienists | Dental Hygiene |
| Health Administrators | Hospital Care Administration |
| Clinical Lab. Technologists and Technicians | Medical Laboratory Technology |
| Health Record Technologists and Technicians | Medical Record Librarianship |
| Physicians, Medical and Osteopathic | Medicine and Osteopathy |
| Registered Nurses | Nursing |
| Optometrists | Optometry |
| Pharmacists | Pharmacy |
| Therapists | Physical and Occupational Therapy |
| Veterinarians | Veterinary Medicine |
| Chiropractors | |
| Other Health Technologists and Technicians | Residual of Health Professions |
| Health Specialties Teachers | |
| Other Health Practitioners | |

**Other Professional Fields**

| | |
|---|---|
| Architects | Architecture (excluding Planning) |
| Accountants | Accounting |
| Real Estate Appraisers | |
| Editors and Reporters | |
| Public Relations and Publicity Writers | Communications |
| Radio and Television Announcers | |
| Prekindergarten and Kindergarten Teachers | |
| Elementary School Teachers | |
| Secondary School Teachers | |
| Coaches and Physical Education Teachers | Education and a percentage of other fields of study* |
| Education Teachers | |
| School Administration, Elementary and Secondary Schools | |
| Other Teachers, except College and University | |
| Aeronautical and Astronautical Engineers | |
| Chemical Engineers | |
| Civil Engineers | |
| Electrical and Electronic Engineers | |
| Industrial Engineers | |
| Mechanical Engineers | Engineering |
| Metallurgical and Materials Engineers | |
| Mining Engineers | |
| Petroleum Engineers | |
| Sales Engineers | |
| Other Engineers | |
| Engineering Teachers | |
| Tool Programmers, Numerical Control | |
| Lawyers | |
| Judges | Law |
| Law Teachers | |
| Librarians | Library Science |
| Social Workers | Social Work and Social Services |

*The fields from which varying percentages are assigned to Education because they produce specialized majors with teaching certificates were determined by reference to National Education Association, *Research on Teacher Supply and Demand in Public Schools 1972*, Table 2.