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ABSTRACT

Meeting the challenge of developing programs responsive to the manpower needs of the District of Columbia in the 1980's is presented as a fundamental aspect of planning and development at Federal City College. Current employment opportunities in the District as well as forecasts of occupational demand for areas requiring bachelors degrees are presented and compared with current degree productivity at local public and private institutions. Comparisons reveal that shortages exist (and will continue to exist unless certain programs expand) for graduates in engineering, health sciences, and business, while local institutions continue to produce a surplus of graduates in the social sciences, psychology, and education. It is recommended that career counseling be strengthened and necessary steps be taken to expand specific programs which have high demands for graduates. (Author)

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February, 1974

Office of Institutional Research
Office of Academic Affairs and Provost
FEDERAL CITY COLLEGE

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Meeting the challenge of developing programs responsive to the manpower needs of the District of Columbia in the 80's is presented as a fundamental aspect of planning and development at Federal City College. Current employment opportunities in the District as well as forecasts of occupational demand for areas requiring bachelors degrees are presented and compared with current degree productivity at local public and private institutions. Comparisons reveal that shortages exist (and will continue to exist unless certain programs expand) for graduates in engineering, health sciences, and business while local institutions continue to produce a surplus of graduates in the social sciences, psychology, and education.

In light of these observations, it is recommended that career counseling be strengthened and necessary steps be taken to expand specific programs which have high demands for graduates.

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INTRODUCTION

FCC's objective to provide a "highly qualified source of manpower for the District of Columbia" portends policies affecting long-range goals for our academic programs and their corresponding physical and financial resource requirements. At a time when education is affected by a wide-range of public priorities for other social programs, it is important that one analyzes the labor market demand for graduates with bachelors' degrees in the District of Columbia. Such a review, while tenuous because of uncertainties regarding the accuracy of manpower forecasts, is considered as an important step in identifying which undergraduate programs appear to offer graduates the greatest chance for employment and, conversely, which programs offer them little promise.

While this approach is not the sole criterion for allocating existing resources or for planning future program expansion, it appears critically important as an indicator of a program's potential success.[1] In addition, it would seem that providing educational programs that appear to result in an increasing surplus in candidates for certain occupations while other fields remain understaffed is inconsistent with the land-grant objectives of this institution. Similarly, allocating future budgets to support educational programs without cognizance of their "output" and its corresponding value to the District of Columbia would appear to miss a fundamental goal of higher education - investment in the future of our residents as a valued resource.

[1] This approach should not imply that public education is reviewed exclusively as a "producer" good. Rather, it is assumed that if the consumer (student) invests a substantial portion of time and money in an education then he might expect future employment as one benefit of his investment.

Our analysis of the extent to which FCC programs produce graduates compatible with labor market demands for occupations requiring a bachelors degree is based upon the employment forecasts prepared for the District of Columbia Department of Human Resources and the D.C. Manpower Administration[1] by Arthur D. Little. A.D. Little's report consisted of two demand components, replacement demand and new positions. Replacement demand has been selected as the base for one aspect of this analysis. This approach assumes that at the very least the output of public and private institutions in the District should be such that it will accommodate local normal attrition for certain occupations. Prospects for planning on the basis of a total demand reflecting new positions, (hence, economic growth) has also been explored in light anticipated growth rates for particular occupations. This information and current relationships between supply and demand for selected occupations are used to suggest directions for expansion of current academic programs. Rates of growth required to achieve a balance between supply and demand in the 80's is presented as a backdrop for the development of policies concerning change in program support and enrollment.

RESULTS AND CONCLUSIONS

Between July 1, 1972, and June 30, 1973, colleges and universities in the District of Columbia conferred nearly 6,400 backelor's degrees. ADL forecasted between 3,900 replacement and 2,300 new jobs for all job

[1] Arthur D. Little, Manpower Requirements in the Washington Standard Metropolitan Statistical Area: A Guide to Planning Education and Training for Public Education in the District of Columbia, (Acorn Park, Massachusetts, August 6, 1971).

applicants holding bachelors or higher degrees during this period. In view of the relatively static job market in the District of Columbia during this time frame and the limited prospect of "new" jobs, it is most probable that the majority of job vacancies resulted from normal attrition. This means that approximately two students were graduated for each possible job opportunity.

As one might imagine, the general observation of extreme surplus of graduates changes considerably when beginning to examine specific occupations. Twenty-one occupations under six major categories:

- Business Management and Commerce Occupations;
- Data Processing Occupations;
- Engineering and Engineering Mechanical Technical Occupations;
- Health Profession, Health Services, and Paramedical Occupations;
- Social and Welfare Workers;
- Professional Occupations Except Health, Business, Engineering;

were examined to improve our insights regarding how well FCC was contributing to the manpower demand of D.C. for bachelors degree candidates.[1] It was also hoped that this review would assist the College in recognizing which programs might need increased support to meet anticipated labor needs of the community.

Table 1 has been prepared to show the proportionate share of 1973 bachelors degree graduates from local colleges by occupational area and the portion supplied by FCC. Approximately, 34% (2,121) of the degrees conferred were in the social sciences while an additional 20% (1,276)

[1] These occupational categories were considered to rely on job applicants holding a bachelors degree or higher degree.

Table 1

Bachelor's Degrees Granted by Colleges and Universities in the District of Columbia
July 1, 1972 to June 30, 1973

OCCUPATION	Total Public & Private Institutions		Private Institutions		Public Institutions			
					Total		Federal City College	
	#	%	#	%	#	%	#	%
BUSINESS MANAGEMENT & COMMERCE OCCUPATIONS								
Accounting	188	3.0	172	3.0	16	2.4	16	3.7
Marketing Management and Labor Relations	579	9.1	520	9.1	59	8.9	59	13.7
Editors and Reporters	174	2.7	161	2.8	13	2.0	11	2.6
Performing Arts	361	5.7	353	6.2	8	1.2	8	1.8
DATA PROCESSING OCCUPATIONS	38	.6	26	.4	12	1.8	12	2.8
ENGINEERING & ENGINEERING MECHANICAL TECHNICAL OCCUPATIONS								
Electrical Engineering	79	1.2	75	1.3	4	.6	4	.9
Other Engineering	95	1.5	95	1.7	-	-	-	-
Designers Except Draftsmen	15	.2	1	a	14	2.1	14	3.2
HEALTH PROFESSION, HEALTH SERVICES, & PARAMEDICAL OCCUPATIONS								
Nurses	193	3.0	180	3.2	13	2.0	13	3.0
Psychologists	453	7.1	421	7.4	32	4.8	32	7.4
Other Health	138	2.2	129	2.3	9	1.4	9	2.1
SOCIAL & WELFARE WORKERS	37	.6	17	.3	20	3.0	20	4.6
PROFESSIONAL OCCUPATIONS EXCEPT HEALTH, BUSINESS, ENGINEERING								
A. Social Scientists	(2121)	(33.5)	(1965)	34.6)	(156)	(23.6)	(137)	(31.8)
Economists	185	2.9	164	2.9	21	3.2	21	4.9
Other	1936	30.6	1801	31.4	135	20.4	116	26.9
B. Natural Scientists	(542)	(8.5)	(514)	(9.1)	(28)	(4.3)	(23)	(5.4)
Chemists	73	1.1	67	1.2	6	.9	3	.7
Biological Scientists	295	4.6	282	5.0	13	2.0	12	2.8
Mathematicians	82	1.3	79	1.4	3	.4	3	.7
Physicists	35	.6	30	.5	5	.8	5	1.2
Other	57	.9	56	1.0	1	.2	-	-
C. Education	1276	20.1	1005	17.6	271	41.1	68	15.8
D. Other Professions	(67)	(1.0)	(62)	(1.0)	(5)	(.8)	(5)	(1.2)
Architects	59	.9	59	1.0	-	-	-	-
Librarians	8	.1	3	a	5	.8	5	1.2
TOTAL	6356	100.0	5696	100.0	660	100.0	431	100.0
%	100.0		89.6		10.4		6.8	

a Less than .01%.

represent new teachers for primary and secondary schools. How well these numbers of graduates and their counterparts in other disciplines fulfill the manpower needs of the District of Columbia is revealed in Table 2. This table reflects the anticipated balance between supply (number of graduates) and demand (number of positions available) for bachelor's degree candidates.

While it is obvious that local private institutions provide nearly 90% of the potential job candidates, it is less obvious how many of these graduates actually remain in the District of Columbia after graduation. Review of reports concerning residence and migration of college students during 1968 suggests that only 16% of the graduates of local private institutions remain in the District of Columbia after graduation.[1] However, one cannot be certain of the causes of this migration[2] or of the extent to which the overall migration rate varies by discipline. In order to minimize this degree of uncertainty, the consequences of three rates of graduate retention (16%, 50%, and 100%) are shown as possible rates of supplying manpower for employment opportunities in the District. The most likely range of supply has been selected as between 16% and 50% in light of the current job market situation. Figures based on this constraint have been used to adjust observations of surpluses and shortages of personnel for each occupation.

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[1] 98% of residents of the District of Columbia who were enrolled in local public institutions remained in D.C., George H. Wade, Residents and Migration of College Students (Office of Education, HEW, Washington, D.C.), 1970.

[2] Unavailability of openings in some particular jobs requiring specific skills; pursuit of higher studies; or for relocation purposes.

Table 2

Graduate Supply of Bachelors Degree Candidates Vs. Demand For Selected Occupations in the District Of Columbia - 1973

OCCUPATION	(1) Total Supply Public and Private Institutions #	%	(2) Estimated Occupational Opportunities For Bachelors Degree Candidates	(3) Number of Applicants Per Vacancy Likely Range[a]	Graduate Supply Vs. Demand	
BUSINESS MANAGEMENT & COMMERCE OCCUPATIONS						
Accounting	188	3.0	212	.2 - .5	Shortage	**
Marketing Management and Labor Relations	579	9.1	1310	.1 - .2	Extreme Shortage	***
Editors and Reporters	174	2.7	36	1.1 - 2.6	Surplus	+
Performing Arts	361	5.7	156	.4 - 1.2	Possible Shortage	*+
DATA PROCESSING OCCUPATIONS	38	.6	23	.7 - 1.1	Possible Shortage	*
ENGINEERING AND ENGINEERING MECHANICAL TECHNICAL OCCUPATIONS						
Electrical Engineering	79	1.2	57	.3 - .7	Possible Shortage	*
Other Engineering	95	1.5	227	.1 - .2	Extreme Shortage	***
Designers Except Draftsmen	15	.2	27	.5 - .5	Extreme Shortage	***
HEALTH, PROFESSION, HEALTH SERVICES, AND PARAMEDICAL OCCUPATIONS						
Nurses	193	3.0	153	.3 - .7	Possible Shortage	*
Psychologists	453	7.1	5	19.8 - 48.5	Very Large Surplus	++++
Other Health Workers	138	2.2	131	.2 - .6	Shortage	**
SOCIAL AND WELFARE WORKERS	37	.6	nil[c]	N.A.	N.A.	
PROFESSIONAL OCCUPATIONS EXCEPT HEALTH, BUSINESS ENGINEERING						
A. Social Scientists	(2121)	(33.5)				
Economists	185	2.9	36	1.3 - 2.3	Surplus	+
other	1936	30.6	68	6.2 - 15.2	Large Surplus	+++
B. Natural Scientists	(542)	(8.5)				
Chemists	73	1.1	29	.6 - 1.3	Possible Shortage	*+
Biological Scientists	295	4.6	31	1.9 - 5.0	Surplus	++
Mathematicians	82	1.3	48	.3 - .6	Possible Shortage	*+
Physicists	35	.6	19	.5 - 1.0	Possible Shortage	*
Other[c]	57	.9	82	.1 - .4	Extreme Shortage	***
C. Education	1276	20.1	264	1.6 - 2.9	Surplus	+
D. Other Professions	(67)	(1.0)				
Architects	59	.9	27	.3 - 1.1	Possible Shortage	*+
Librarians	8	.1	nil[b]	N.A.	N.A.	
TOTAL	6356	100.0				

\+ Notation of Surplus of more than 1 applicant per vacancy.
* Notation of shortage of less than 1 applicant per vacancy.
*+ Possible balance between supply and demand.

a Based on 16% to 50% of graduates from local private institutions and 100% of graduates from local public institutions seeking jobs in D.C.
b Masters Degree or higher degree required for nearly all professional positions.
c Includes Astronomy, Geology, Oceanography, and Metallurgy.

Expected numbers of applicants per job vacancy are shown by retention range to illustrate manpower shortages and surpluses in the occupations reviewed. These data suggest that extreme shortages of bachelors degree candidates may be found in:

- Marketing, Management and Labor Relations, most Engineering Professions, and in;
- Natural Science Fields possibly hiring graduates in Geology, Astronomy, Oceanography, Earth Sciences and Metallurgy.[1]

Shortages of bachelor degree candidates may also exist for:

- Accountants,
- graduates in Computer Science,
- health workers such as Dieticians, Pharmachists, and Medical Technicians,
- Nurses, and
- Physicists.

Large surpluses of graduates are shown for social scientists (6 to 15 applicants per job) and psychologists (20 to 48 applicants per job).

Surpluses exist for librarians and social welfare workers. However, review of national statistics on degrees conferred for these disciplines[2] suggests that graduates in these fields are generally expected to possess masters degrees in order to qualify for professional positions. For this reason, these categories have been excluded from our assessment of occupational opportunities for bachelor's degree candidates.

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[1] In this case our analysis suggests that most disciplines stressing search for an application of new natural resources are in "high" demand.

[2] Mary E. Hooper. Earned Degrees Conferred: 1969-70 Institutional Data (HEW, Higher Education Surveys Branch, Washington, D.C., 1970)

Implications for future program planning at FCC are perhaps obvious in light of these observations. Table 1 reveals that in most cases this institution is providing graduates in proportions comparable with other local institutions, although our share of the total graduate pool is less than 7%. Despite this striking similarity between FCC's productivity and all other local colleges, a possible reemphasis of program priorities appears in order if this colleges intends to increase its fulfillment of providing a source of manpower to the District of Columbia.

More specific recommendations became apparent while reviewing Table 3. Here an attempt has been made to examine the growth potential of the occupations reviewed in Table 2 and estimate the rates of program growth (or decline) required to overcome observed imbalances between outputs of current degree programs and expected demand for graduate applicants through 1980. Column 5A reflecting the average annual change in program output required to achieve parity with the anticipated occupational targets in 1980 has been selected as the most realistic picture of program growth potential. These rates of change are based upon the likelihood that only 16% of the graduates of all the local private institutions will remain in the District[1], and these figures were used to formulate the "Policy Projections through 1980."

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[1] Because there appears to be a relation between degrees granted and FTE enrollment in the local private institutions and because the local institutions do not appear to be projecting an enrollment growth rate greater than 14% in the next 7 years, it is reasonable to assume that FCC will be prepared to produce most of the graduates qualified to fill occupational vacancies in the '80's. (See Resources Needs of Private Institutions of Higher Education in the District of Columbia:. Projected 1971 to 1985 (District of Columbia Commission on Academic Facilities, Washington, D.C.) 1971 Part B - Tables 1 and 27.

Table 3

Anticipated Rates of Employment Changes for Selected Occupations in Metropolitan Washington 1973 to 1980

OCCUPATION	Rate of Change 1973-1980[a] %	Rank	Applicants/ Vacancy (Likely Range)[b]	% Change in Number of Graduates to Fill Vacancies[d]		Average % Change in Program Output/Year[e]		Growth Requirements Rank[f]	Policy Projections Through 1980
	(1)	(2)	(3)	(4A)	(4B)	(5A)	(5B)	(6)	(7)
BUSINESS MANAGEMENT & COMMERCE OCCUPATIONS									
Accounting	23	14	.2 - .5	515 to	76	73 to	11	5	
Marketing Management and Labor Relations	16	19	.1 - .2	1060 to	480	151 to	69	3	Stimulate Enrollment - Increase Business School Budget.
Editors and Reporters	35	4	1.1 - 2.6	23 to	-48	3 to	7	15	Standstill Budget For Majors.
Performing Arts	33	8	.4 - 1.2	232 to	11	33 to	1	10	Expand Program, Stimulate Enrollment.
DATA PROCESSING OCCUPATIONS	62[b]	1	.7 - 1.1	131 to	47	19 to	7	13	Expand Program, Stimulate Enrollment
ENGINEERING & ENGINEERING MECHANICAL TECHNICAL OCCUPATIONS									
Electrical Engineering	47	3	.3 - .7	390 to	110	56 to	16	6	Expand, Stimulate Enrollment.
Other Engineering	21	15	.1 - .2	1110 to	505	159 to	72	2	Expand Civil, Misc., Gov. Industrial
Designers Except Draftsmen	35	5	.5	170		24		11	Expand C.P. and D Department, Stimulate Enrollment.
HEALTH PROFESSION, HEALTH SERVICES, & PARAMEDICAL OCCUPATIONS									
Nurses	45	4	.3 - .7	383 to	107	55 to	15	7	Expand, Stimulate Enrollment.
Psychologists	34	7	19.8 - 48.5	-93 to	-97	-13 to	-14	*20	Reduce Program Advise to change majors
Other Health	50	2	.2 - 16	650 to	150	93 to	21	4	Develop strong health technician and dietician programs.
SOCIAL & WELFARE WORKERS	29	10	N.A.[c]	N.A.		N.A.		-	Advise Department to change requirements to meet Masters Degree requirement as terminal degree.
PROFESSIONAL OCCUPATIONS EXCEPT HEALTH, BUSINESS, ENGINEERING									
A. Social Scientists									
Economists	27	11	1.3 - 2.3	-2 to	-45	0 to	-6	*16	Standstill budget for majors.
Other	10	20	6.2 - 15.2	-82 to	-93	-12 to	-13	*19	Reduce budget for majors - Advise majors to seek other major.

a. Manpower Directions in Metropolitan Washington, D.C.: A Forecast of Manpower Demands and Employment by Industry and Occupation - 1972 to 1980, (D.C. Manpower Administration, Washington, D.C. 1972). Table A-8.

b. Number of applicants per vacancy (likely range) - Table 2.

c. Masters Degree or higher degree required for nearly all professional positions.

d. % graduates required to fill vacancies (%GFV) = $100\left[\frac{1 + \frac{\text{Col. 1}}{100}}{\text{Col. 3}} - 1\right]$

e. Col. 4 + 7 years.

f. Ranking based on Col. 5A i.e., 16% of graduates from local private institutions remaining in D.C. to seek employment. * = declining growth rate.

Table 3 (Continued)

Anticipated Rates of Employment Changes for Selected Occupation in Metropolitan Washington 1973 to 1980

	Rate of Change 1973-1980 %	Rank	Applicants/ Vacancy (Likely Range)	% Change in Number of Graduates to Fill Vacancies		Average % Change in Program Output/Year		Growth Requirements Rank	Policy Projections Through 1980
	(1)	(2)	(3)	(4A)	(4B)	(5A)	(5B)	(6)	(7)
B. Natural Scientists									
Chemists	26	12	.6 - 1.3	110	to 13	16	to 0	14	Increase budget - Stimulate Enrollment.
Biological Scientists	19	17	1.9 - 5.0	-37	to -76	-5	to -11	*17	Reduce budget for major- seek other major
Mathematicians	25	13	.3 - .9	317	to 39	45	to 6	8	Increase budget - Stimulate Enrollment.
Physicists	19	17	.5 - 1.0	130	to 19	20	to 3	12	Increase budget - Stimulate Enrollment.
Other	31	9	.1 - .4	1210	to 228	173	to 32	1	Dev. new programs-Stimulate Enrollment.
C. Education	7	22	1.6 - 2.9	-33	to -63	-5	to -9	*17	Reduce Budget - Advise majors to seek other programs.
D. Other Professions									
Architects	20	16	.3 - 1.1	300	to 9	43	to 1	9	Develop new program or increase program of CP&D.
Librarians	9	21	N.A.			N.A.		-	Advise Department to change requirements to meet Masters Degree requirement as terminal degree.

a. Manpower Directions in Metropolitan Washington, D.C.: A Forecast of Manpower Demands and Employment by Industry and Occupation - 1972 to 1980, (D.C. Manpower Administration, Washington, D.C. 1972). Table A-8.

b. Number of applicants per vacancy (likely range) - Table 2.

c. Masters Degree or higher degree required for nearly all professional positions.

d. % graduates required to fill vacancies (%GFV) = $100\left[\frac{1 + \frac{\text{Col. 1}}{100}}{\text{Col. 3}} - 1\right]$

e. Col. 4 + 7 years.

f. Ranking based on Col. 5A i.e., 16% of graduates from local private institutions remaining in D.C. to seek employment. * = declining growth rate.

As shown in column 6, the highest growth potential is in "other" natural science fields. (It may be recalled that this occupational category refers to earth sciences, astrophysics, astronomy, oceanography metallurgy, and other natural science disciplines focusing on exploration and reclamation of natural resources.) The second highest potential concerns civil, mechanical and industrial engineering. Expected demand for these disciplines may be explained by ADL's optimism regarding growth in local construction over the next 7 years.

ANALYTICAL APPROACH

In this section, we discuss the procedures used in data collection and analysis which yielded the figures in Tables 1-3 of the previous sections and are therefore basic to the conclusions presented therein. The data sources used and assumptions presented to validate the analysis have also been made explicit in the description of our methodology.

The source for estimates of manpower demand in various occupational areas in the District of Columbia is a recent study done by Arthur D. Little, Inc., for the D.C. Government. This study projects the manpower demand be detailed occupational categories for the year 1973.[1] Categories which obviously did not require college education were omitted in the analysis. Column 1, Chart A lists the occupational categories considered for analysis in this study. Some of these categories are aggregates of those given in the ADL Study and are indicated in column 2 of the chart. For example, Mathematical Scientists include "Mathematicians"

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[1] Op cit., pp.F2-F14.

and "Statistician Actuarians" in this study.

The manpower demand projected in the ADL Study is for the entire Metropolitan Washington Area. To derive the demand estimates for the District alone, the ADL Study recommends use of a deflation factor of 0.266[1] based on the ratio of population of D.C. to that of the WSMSA. This recommendation has been followed in our analysis. Columns 1 and 2 of Table 4 show these data for opportunities forcasted for D.C.

A major task in this analysis was to assign bachelors degrees in various disciplines to appropriate occupational areas. Any scheme for such assignment has to be arbitrary to a certain extent, and our approach was to assign a discipline to the occupational area for which it provides the most direct training. An economics graduate may find a job as an editor, but this education is most relevant to the profession as an economist. This scheme is quite appropriate when it is kept in mind that the objective of the analysis is to find how well the output of institutions in the District fulfill the employment demands. The determination of the nature of training received in a discipline was made using judgement based on a knowledge of the course curriculum. Column 3, Chart A shows the assignment of disciplines to occupational categories. The HEGIS Taxonomy of instructional programs code has been used to indicate the disciplines[2] and their probable occupational alignment.

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[1] Ibid, p.116.

[2] WICHE Program Classification Structure National Center for Higher Education Management Systems at Boulder, Colorado, June 1972.

CHART A

Number of Earned Bachelors and Masters Degrees (Total U.S.) and Estimated % Openings to B.S. Graduates by Selected Occupational Areas, With Corresponding Categories Cited by ADL Study and HEGIS Taxonomy of Instructional Program Codes

OCCUPATIONAL AREA	ADL CATEGORIES[a]	HEGIS CODES RELEVANT TO OCCUPATION	EARNED DEGREES FOR TOTAL U.S.[b]		PERCENT OPENINGS AVAILABLE TO BACHELORS[c]
			Bachelors	Masters	
Electrical Engineering	Electrical Engineering	0909	12,288	4,138	.6632
Other Engineering	All Engineers, Technical other than Electrical Engineering	All 0900 exc 0909	26,427	8,551	.6764
Nurses	Nurses, Professional	1203	11,280	1,549	.8627
Psychologists	Psychologists	All 2000	33,854	4,120	.8784
Other Health Professions	Dietitians, Pharmacists, Medical Technicians, Technicians, Other Medical and Health Workers	All Other 1200, All 1300	9,104	526	.9423
Education	All Teachers Except College Teachers	All 0800, All 1100, Part 1500*	244,230	93,429	.6175
Chemists	Chemists	1905, Through 1909	11,617	2,119	.8176
Biologists	Biological Scientists	All 0400	37,676	5,835	.8452
Math Scientists	Mathematicians, Statisticians and Actuarians	1701, 1702, 1703	27,886	6,239	.7769
Physicists	Physicists	1902 to 1906	5,333	2,205	.5866
Other Natural Scientists	Agriculture, Geology and Other Natural Scientists	Other 1900; 0100, all 4900	33,000	7,995	.7578
Economists	Economists	2,204	17,258	1,190	.9311
Other Social Scientists	Other Social Scientists	Other 2200, 2100 exc 2104, 0300	155,926	24,131	.8453
Accounting	Accountants and Auditors	0502	21,354	1,895	.9113
Architects	Architects	0202	3,902	658	.8314
Designer (Physical Planning)	Designer exc Draftsmen	All 0200 exc 0202	"	"	"
Journalists	Editors and Reporters	All 0600; Pt. 1500*	5,959	862	.8554
Librarians	Librarians	All 1600	1,054	6,000	**
Managers etc.	Managers, Officials, Proprietors, Personnel Labor Relations	All 0500 exc 0502	107,153	2,169	.7976
Social Workers	Social and Welfare Workers	2104	4,143	5,735	**
Workers in Art	Workers in Art, Entertainment	All 1000	35,945	4,800	.8665
Computer Profession	Computer Programmers***	All 0700	1,880	1,503	.2006

(a) Arthur D. Little: "Manpower Requirements in the Washington SMSA," August 6, 1971.
(b) HEW Annual Survey 1969-70: "Earned Degrees Conferred; 1969-70 Institutional Data".
(c) Percent = $\left(\frac{\text{Bachelors} - \text{Masters}}{\text{Bachelors}}\right) \times 100$

* 90% of output in 1500 (English and Literature) allocated to Education and 10% to Journalism.
** % available to bachelors degree holders is negligible.
*** See Addendum to ADL Report referred in (a) above.

Table 4

Estimated Occupational Opportunities and Expected Share for B.A. Graduates As Well As The Expected % Share of Replacement Positions Apportioned by Type of Institution Within the D.C. Higher Education System

OCCUPATION	Estimated Occupational Opportunities (All Degrees)		Expected Share of Opportunities Filled by Bachelor Degree Graduates		Potential Job Candidates and Their Expected Share (%) of Replacement Positions for Bachelors Degree Graduates							
									Graduates From Other Local Institutions Expected To To Seek Jobs in D.C.		Total D.C. Schools	
	Total #	Replacement #	Total #	Replacement #	#	FCC (%)	Total Public Schools #	(%)	16%/100% #	16%/100% %	16%/100% #	16%/100% %
MANAGEMENT OCCU-												
[illegible]	374	233	341	212	16	(7.5)	16	(7.5)	28/172	(13.2/81.1)	44/188	(20.7/88.6)
[illegible] Management and [illegible] Relations	2326	1643	1855	1310	59	(4.5)	59	(4.5)	83/520	(6.3/39.1)	142/579	(10.8/44.2)
Editors, Reporters	75	42	64	36	11	(30.5)	13	(36.1)	26/161	(72.2/447.2)	39/174	(108.3/483.3)
Performing Arts	322	180	279	156	8	(5.1)	8	(5.1)	56/353	(35.9/226.3)	64/361	(41.0/231.4)
[illegible] TISING S	115	(115)	23	(23)	12	(52.2)	12	(52.2)	4/26	(17.4/113.0)	16/38	(69.6/165.2)
[illegible] & MECHANI- [illegible] TIONS												
Electrical Engi- neering	189	86	125	57	4	(7.0)	4	(7.0)	12/75	(21.0/131.6)	16/79	(28.1/138.6)
Other Engineering	536	335	363	227	0				15/95	(6.6/41.8)	15/95	(6.6/41.8)
[illegible], Except [illegible]n	78	33	65	27	14	(51.8)	14	(51.8)	0/1	0/3.7	14/15	(51.8/55.5)
[illegible] PRESSIONS, [illegible] VICES & [illegible] L [illegible] S												
Nurses	351	177	303	153	13	(8.5)	13	(8.5)	29/180	(18.9/117.6)	42/193	(27.4/126.1)
Psychologists	12	6	11	5	32	(640.0)	32	(640.0)	67/421	(1340.0/8420.0)	99/453	(1980.0/9060.0
Other [illegible]th	447	78	421	131	9	(6.9)	9	(6.9)	21/129	(16.0/98.5)	30/138	22.9/105.4)
[illegible] LEARN [illegible]	132	78	nil	nil	20	(na)	20	(na)	3/17	(na)	23/27	(na)

Table 4 (Continued)

Estimated Occupational Opportunities and Expected Share for B.A. Graduates As Well As The Expected % Share of Replacement Positions Apportioned by Type of Institution Within the D.C. Higher Education System

OCCUPATION	Estimated Occupational Opportunities (All Degrees)		Expected Share of Opportunities Filled by Bachelor Degree Graduates		Potential Job Candidates and Their Expected Share (%) of Replacement Positions for Bachelors Degree Graduates							
					FCC		Total Public Schools		Graduates From Other Local Institutions Expected To To Seek Jobs in D.C.		Total D.C. Schools	
	Total #	Replacement #	Total #	Replacement #	#	(%)	#	(%)	16%/100% #	16%/100% %	16%/100% #	16%/100% %
Professional Occupation Except Health, Business, Engineering												
A. Social science												
Economics	80	48	61	36	21	(58.3)	21	(58.3)	26/164	(72.2/455.6)	47/185	(130.5/511.6)
Other	105	80	89	68	116	(170.6)	135	(198.5)	288/1801	(423.5/2648.5)	423/1936	(622.0/2847.0)
B. Natural Scientists												
Chemists	61	35	50	29	3	(10.3)	6	(20.7)	11/67	(37.9/231.0)	17/73	(58.6/251.7)
Biological Scientists	58	37	49	31	12	(38.7)	13	(41.9)	45/282	(145.2/909.7)	58/295	(187.1/951.6)
Mathematicians	105	62	82	48	3	(6.2)	3	(6.2)	13/79	(27.1/164.6)	16/82	(33.3/170.8)
Physicists	57	33	33	19	5	(26.3)	5	(26.3)	5/30	(26.3/157.9)	10/35	(52.6/184.2)
Other	173	108	131	82	0	-	1	(1.2)	9/56	(11.0/68.3)	10/57	(12.2/69.5)
C. Education	482	427	298	264	68	(25.8)	271	(102.6)	161/1005	(61.0/380.7)	432/1276	(163.6/483.3)
D. Other Professions												
Architects	50	33	42	27	0	-	0	-	9/59	(33.3/218.5)	9/59	(33.3/218.5)
Librarians	77	63	nil	nil	5	(na)	5	(na)	1/3	(na)	6/6	(na)

Once the assignments of instructional programs to occupational categories were made, it was a relatively easy task to find the bachelor's degree output of area schools in the various occupations. The information supplied by area schools in response to the Health, Education and Welfare Department's survey on degrees awarded during 1972-73 provided the source of our data.[1] The following public and private schools were considered:

Public Schools:

Federal City College
D.C. Teacher's College

Private Schools:

American University
Catholic University of America
Georgetown University
George Washington University
Howard University
Gallaudet College
Trinity College
Southeastern University

The number of bachelor degrees awarded in various disciplines under the appropriate HEGIS codes were aggregated to indicate the bachelor's degree output relevant to each occupational area. Column 11, Table 4 displays the data for all schools while columns 4 through 9 give the data for FCC, all public and private schools.

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[1] U.S. Department of Health, Education and Welfare, Residence and Migration of College Students-Analytic Report; Fall 1968.

In comparing the D.C. schools' output with the D.C. demand, one must recognize that a certain number of students who graduate from local colleges and universities are likely to seek jobs elsewhere ;therefore, they are not potentially available to meet D.C. manpower demand. The Residents and Migration Report on college graduates shows that only 16% share in the available manpower pool of bachelor's degree graduates in the District of Columbia. The Resident Migration Report shows that about 67% of the graduates of public schools remain in the District.

However, no deflation of public school output has been made for the following reasons. First, there is some doubt about the relevancy of the ratio which was based on Fall 1968 data when FCC was not in full operation. Second, it is known that 98% of D.C. residents graduating from public schools remain in D.C. Thus, given the fact that FCC's resident percentage is 95%,one may expect that about 93% of FCC graduates should be available to seek local employment opportunities.[1] Third, for the purposes of our study (which focuses on the extent to which FCC and public colleges meet D.C. Manpower needs) it appears appropriate to use the total output of FCC and DCTC. It is recognized that the migration propensity may not be the same for graduates from all disciplines. Thus, it may be that engineering graduates are more likely than Social Science majors to seek jobs outside D.C. However, lack of definite data forced the use of a single rate in our analysis. The sensitivity analysis, using three different residency rates (namely, 16%, 50%, and 100%) is presented as a safeguard against making unwarranted conclusions on this score.

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[1] Federal City College, Office of Institutional Research, "Estimated Net Tuition Revenue during FY 1974 (Washington, D.C., February 1973)

Another kind of modification may be necessary, however, to adjust for the fact that the ADL Projections are for total manpower requirements in an occupational area. Some of these positions will likely require (and be filled by) Master's and Ph.D level graduates. The following approach was adopted to obtain the percentage of positions in an area that would be available to undergraduates. The entire national output of bachelors and masters degrees under disciplines relevant to a particular occupation was obtained from HEW's earned degrees report for 1969-70.[1] If the annual rate of output for the nation is 100 bachelors degrees and 35 masters degrees, then, the percentage of jobs available to bachelors is taken as $\frac{(100 - 35)}{100}$ or 65%. The rationale and assumption behind the suggested formula are the following: we assume that the production and demand of college graduates in a discipline are roughly in balance; (2) further, we assume that the M.S. and Ph.D graduates in a discipline had their Bachelors' degree in the same area. Therefore, to produce an annual output rate of 100 bachelor and 35 masters' degree holders, it is necessary that 35 out of the 100 bachelors' degree holders go on for graduate work; the remaining sixty five seek and find jobs. Since the total graduate production and demand is assumed in balance, the annual total opportunities is 100. The share of employment opportunities for undergraduates is 65 or 65% of their 100 job opportunities. Column 4, Chart A shows the number of earned bachelors and masters degrees. In Social Work and Library Science, it is seen that the number of masters degree graduates is higher than the bachelors. In such cases, the

[1] Earned Degrees Conferred: 1969-70 Institutional Data, U.S. Department of health, Education and Welfare, Office of Education.

percentage of positions available to bachelors is taken to be negligible. Columns 3 and 4 reveal the share of D.C. job opportunties available to undergraduates based upon the above formula.

The change in graduates to fill vacancies (GFV) in 1980 were obtained from a U.S. Manpower Forecast for the District of Columbia and used along with the 1973 estimates to obtain the total growth percentage, G in each occupational area during the period 1973-1980. A growth factor G% (shown in column 1 of Table 3) has been considered to produce estimates of 1980 demand. This factor represents the total growth rate between 1973 and 1980 so that demand in 1980 is (1+G) times the 1973 demand. If APV is the applicants per vacancy (given in Column 3 of Table 3) as it stands in 1973 then:

$$GFV = \left[\frac{\left(1 + \frac{G}{100}\right)}{APV} - 1 \right] \times 100$$