

**POST-HIGH SCHOOL TECHNICAL EDUCATION NEEDS
IN THE
RICHMOND-PETERSBURG-HOPEWELL AREA**

**REPORT OF
THE STATE COUNCIL OF HIGHER EDUCATION
to
THE GOVERNOR
and
THE GENERAL ASSEMBLY OF VIRGINIA**



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COMMONWEALTH OF VIRGINIA
STATE COUNCIL OF HIGHER EDUCATION
Room 301, Finance Building

Richmond 19, Virginia, January 30, 1964

To:

HONORABLE A. S. HARRISON, JR., *Governor of Virginia*

and

THE GENERAL ASSEMBLY OF VIRGINIA

Pursuant to item 451.1 of House Bill No. 30 as approved by the General Assembly of Virginia in 1962, the State Council of Higher Education was directed to make a survey of post-high school technical education needs in the Richmond-Petersburg-Hopewell area.

The report submitted herewith is in response to the directive of the General Assembly, and is entitled "A Report on a Study of Post-High School Technical Education Needs in the Richmond-Petersburg-Hopewell Area."

The study was conducted by the staff of the State Council of Higher Education with the assistance of many local representatives of business, industry, education and government. Special assistance was rendered by Mr. O. R. R. Bruce, Jr., Director of Research for the Virginia Employment Commission and Dr. Lynn Emerson, special consultant on technical education. To these and all persons who contributed to this study, the Council wishes to express its gratitude for their generous and able assistance.

Developmental aspects of emerging needs, new programs and the increasing awareness of technical education needs in business and industry make this report simply an initial step and a progress report. Further study and planning needs to be accomplished before an adequate program of technical education can be developed to meet the emerging needs in this area.

Respectfully submitted,

WILLIAM HUGH MCFARLANE, *Director*

A SUMMARY OF CONCLUSIONS

1. Rapid technological changes in business, industry and other areas of economic life require more and more vocational and technical training of workers. Technicians or technical-type workers are becoming increasingly important in industry, business, agriculture, applied and graphic arts, health services and personal services.
2. Continuing economic and industrial growth in the Commonwealth will be more and more dependent upon an adequate supply of trained technical manpower to fill the needs of existing and potential industries.
3. Employment trends in recent years and the emergence of new occupations of a technical nature are indicators of still greater shortages in technical workers unless adequate training programs are developed in the near future.
4. Although many technicians have received training in on-the-job programs, more and more technical-type workers will need to be trained in pre-employment technical programs in high schools, area vocational-technical schools, technical institutes and community colleges.
5. There is a growing shortage of trained technicians in the Richmond-Petersburg-Hopewell area in such occupations as chemical technology, electronics technology, drafting, mechanical technology, air conditioning, instrumentation, tool design and tool making.
6. Although the Richmond-Petersburg-Hopewell area now enjoys a very high rate of employment as compared with most other parts of the state and nation, there are still numerous employment opportunities in the area that require technical and professional training. At the same time there are many employees that are under-employed, partly for lack of training opportunities that could prepare them for more advanced jobs.
7. High schools and private schools in the area are providing a considerable number of training opportunities for persons in business, secretarial and distributive occupations, and some opportunities in skilled occupations. Because of growing demands for these types of workers, there will be a continuing need for even more training programs, particularly at the post-high school level.
8. Very few training programs are now available in this area for technician training. The few technicians that are trained at the Richmond Professional Institute are in great demand as are graduates of schools outside the area.
9. Richmond area industries and businesses have been able to employ scientists and engineers at great cost of time, effort and money. By strengthening and organizing existing public and private educational and research programs through cooperative efforts with industry, greater opportunities could be made available to attract and train necessary scientists and engineers.

RECOMMENDATIONS

1. The development of appropriate post-high school technical education programs in the Richmond-Petersburg-Hopewell area, although urgently needed, should be a part of the total development of a statewide plan for vocational-technical education in Virginia.
2. Renewed efforts should be made to strengthen and expand vocational program offerings in the public schools of the area based on needs and aptitudes of the students and upon the requirements of business and industry.
3. Continuing efforts should be made to develop appropriate pre-technical programs in the high schools in the area that would better equip those students who desire to pursue post-high school technical training.
4. The need for expanded post-high school technical training opportunities in the Richmond-Petersburg-Hopewell area should be reviewed at the earliest possible date by the proposed State Board for Technical Education so that appropriate programs may be developed for citizens of this area.
5. An area-wide technical institute program at the collegiate level with broad programs in engineering, industrial and business technology should be developed as soon as feasible, either as a separate institution or as an identifiable division of an existing collegiate institution. Such an institution should be centrally located to serve the growing technical education needs of citizens and industries in Richmond, Petersburg, and Hopewell.
6. Until a specialized institution can be developed, the existing collegiate institutions should be encouraged to expand their technical programs within available facilities and resources.
7. Adult education programs of a technical, vocational and general nature should be expanded and developed to serve the growing needs of the citizens throughout the area. Such programs may be developed in the high schools, collegiate institutions and in the proposed technical institute.
8. Public and private educational and research institutions now offering advanced educational programs in science and technology should be encouraged to provide cooperative programs for the benefit of existing and potential industrial and professional employees of the area. Representatives of business, industry and education should be encouraged to develop such cooperative programs at the graduate level through the State Council of Higher Education in the very near future.

A Report On A Study Of Post-High School Technical Education Needs In The Richmond-Petersburg-Hopewell Area

INTRODUCTION

An emerging interest in economic and industrial growth as well as an interest in providing more educational opportunities for youth and adults has caused many Virginians to develop an awareness of the need for technical education throughout the Commonwealth.

Acting upon the interests of a number of persons and groups in the Richmond-Petersburg-Hopewell area, the 1962 General Assembly made an appropriation to the State Council of Higher Education to undertake a special study of the needs for technical education in the area. Some special concerns had been voiced by citizens and industrialists in Hopewell and Petersburg for the type of post-high school training program now being offered by the Roanoke Technical Institute in Roanoke, Virginia. Still other groups in the Richmond area had expressed increasing concern over the lack of educational opportunities at the graduate level in science and engineering in this area of the State.

Relationship of Present Study to Other Studies

The 1962 General Assembly also authorized the Governor to appoint a special commission to study the present and future needs of vocational-technical education in Virginia. Such a commission was subsequently appointed and began its study in the latter part of 1962. The report of this group will be available to the 1964 General Assembly. The Director of the State Council of Higher Education was named to the statewide commission to study vocational-technical education.

Early in 1962, the Richmond School Board authorized the establishment of a Citizens' Advisory Committee to study the needs for vocational and adult education in the Richmond area. Again, the Director of the State Council of Higher Education was named as a member of this Advisory Committee. The Richmond group completed the major part of its work by summer of 1963 and made a progress report to the Richmond School Board. As of this date, no action has been taken on the Richmond report.

With similar studies already under way, the State Council of Higher Education decided to defer its study of technical education in the Richmond-Petersburg-Hopewell area until some general guidelines had been developed for the state as a whole. The Council provided the statewide commission with assistance, including the services of its consultant, Dr. Lynn Emerson, for work on vocational-technical education needs throughout the state. In the Spring of 1963, the Council then began to conduct its own study of needs in the Richmond-Petersburg-Hopewell area.

Study Procedures

The principal methods used in conducting the present study were: (1) the gathering of pertinent data on economic, industrial, labor, and educational data from regular and special reports; and (2) the use of selected interviews with key persons in industry, education and government.

Statistical data were gathered from the following sources: Virginia Employment Commission, Virginia Division of Industrial Development and Planning, State Department of Education, State Superintendent of

Public Instruction, County and City Boards of Education, Virginia Economic Reviews, Bureau of Population and Economic Development of the University of Virginia, local and State Chapters of the Chamber of Commerce and miscellaneous reports from various states and the U.S. Office of Education.

Data, judgments, estimates and opinions were also gathered from many persons through group and individual interviews with persons representing industry, educational institutions, public schools, government agencies and Chambers of Commerce.

The Council staff also retained the services of Dr. Lynn Emerson as consultant for the study. Dr. Emerson is a nationally recognized authority in this field and was responsible for writing the volume on "Technical Training in the United States," Appendix 1, for *Education for a Changing World of Work*, the report of the Panel of Consultants on Vocational Education requested by the President of the United States.

In the final stages of its study, then, the Council staff had the benefit of two related reports and the services of a specialist in the field.

Even so, because of limitations of time, staff and funds, the present report is considered to be a progress report to the 1964 General Assembly. This report presents some definitions and guidelines that can be utilized in the development of specific programs to meet emerging needs in at least one area of the state. Much study and refinement remains to be done both in the Richmond area and throughout the state.

Chapter 1

TECHNICAL OCCUPATIONS AND TECHNICAL EDUCATION

Technological Change

Significant technological changes are taking place in industry at a phenomenal rate. Such changes are opening new industrial, economic and social frontiers, and creating new opportunities and challenges for educational institutions of all types and at all levels. Particularly, there is a growing need for a properly trained competent labor force to meet the changing demands of modern industry. The unskilled worker is rapidly disappearing from the scene. The modern worker will need to have some basic training and appropriate skills that are flexible enough to meet the emerging opportunities for employment in a developing technological age.

The nature of jobs now available in Virginia business and industry demands a higher level of skills from more people than is now afforded by the available vocational and technical training. In addition, if Virginia is to continue to attract new industry, the need for workers with new and advanced skills becomes even greater.

What is a Technician?

A "technician" or "technical worker" is a worker who occupies a position between that of a "professional" person and a "skilled" worker.

Professional occupations generally require a high degree of mental activity and are usually concerned with theoretical or practical aspects of complex fields of human endeavor. Such occupations usually require considerable creativity and managerial skill in addition to extensive academic study of a general and specific nature. Professional managerial occupations involve responsibility for policy-making, planning, supervising, coordinating, or guiding the work-activity of others, usually through intermediate supervisors.

Skilled occupations include craft and manual occupations that require a thorough and comprehensive knowledge of processes involved in the work, the exercise of independent judgment, usually a high degree of manual dexterity, and in some instances, responsibility for valuable equipment. Workers in these occupations usually become qualified by serving apprenticeships or completing extensive training programs in "trade" and/or "vocational" schools.

Technicians are taking over many of the tasks previously handled by engineers and scientists as well as serving in many new occupations. The skilled craftsman gives most of his energy to manipulating the tools of his trade. The engineer and professional person, on the other hand, spend most of their time thinking through various problems. Between these extremes lie the occupations which have come to be known as technician jobs, which usually involve some manipulative work along with a considerable amount of mental effort.

Types of Technical Occupations

The growing multiplicity of technician-type occupations makes it difficult to develop an adequate classification system. It is possible, however, to classify these occupations in broad categories such as: (1) engineering-type technicians; (2) industrial-type technicians; and (3) technical specialists. The latter could include an increasing number of technician-type occupations within industry as well as outside of industry.

Within industry itself it is possible to classify technician occupations in relation to functions such as those related to: (1) research, design and development; (2) production; (3) construction and installation; (4) marketing; (5) operational control; (6) maintenance and inspection; and (7) miscellaneous.

Some specific examples of technician-type occupations within industrial research, design and development would include: engineering aide, mechanical draftsman, mathematics technician, tool designer and chemical laboratory technician. Manufacturing production could include such technician-type jobs as operation planner, time-study man, quality control technician, production control supervisor, and job methods technician.

Outside of industry there is a growing number of technician-type occupations in business, merchandising, agriculture, communication, transportation, health services and personal services.

Examples of non-industrial technicians include: medical laboratory technician, dental laboratory technician, optical technicians, recording technician, surveyor and data processing programmer.

Criteria for Identifying Technical Occupations

Technician-type occupations may be identified by the kinds of general abilities required and by the type of tasks that are performed. General abilities include: (1) facility with mathematics; (2) proficiency in the application of scientific principles; (3) an understanding of materials and processes utilized in specialized fields; (4) specialized knowledge within a given field; (5) skills in communication; (6) skills in working with people and (7) skills in working with special tools and instruments.

Some of the tasks that are performed by technicians include:

- Making drawings and charts
- Analyzing and interpreting plans and designs
- Performing mathematical computations
- Making cost estimates of labor, materials and equipment
- Performing laboratory and operation tests of instruments and equipment
- Testing the properties of materials
- Planning and supervising production and assembly processes
- Checking and adjusting production-control
- Supervising construction and installation
- Preparing specifications and estimates
- Writing technical manuals, bulletins and reports
- Operating and servicing highly technical equipment

The tasks performed by technicians may vary considerably from one occupation to another and no single technician would perform all of the functions in the selected list above.

Women in Technical Occupations

There is a growing acceptance of women in technical occupations in industry and outside of industry. Women are being sought to fill positions involving competence in mathematics, statistics and general scientific principles in such jobs as laboratory technicians. Women are also sought to fill jobs that require a combination of technical knowledge and typing as well

as jobs requiring precision, patience and delicate hand skills such as testing, instrumentation adjustment and graphic presentation. In recognition that women do particularly well in many technical-type occupations and in view of the demands that will exist for all types of technicians in the years ahead, women should be encouraged to seek training for many of these occupations.

The Need for Technicians

A national survey of employment by the National Science Foundation and the Bureau of Labor Statistics noted that there were approximately 594,000 technicians in American industry in January, 1960, or an increase of 8 per cent over the preceding year. For the purposes of the survey, technicians were defined as follows:

"All persons engaged in work requiring knowledge of physical, life, engineering, and mathematical sciences comparable to knowledge acquired through technical institute, junior college, or other formal post-high school training, or through equivalent on-the-job training or experience."

The work of the technician was explained as either assisting the scientist or engineer directly, or performing some of the tasks that otherwise would be done by him.

The distribution of 593,600 technicians employed in 1960 was as follows: draftsmen—210,000; engineering and physical science—284,600; medical, agricultural and biological—16,000; and others—82,900. Although nearly all industries shared in the growth of technicians in this one-year period, the greatest percentage of growth was in the engineering and physical science group—13%. The survey also showed that for every scientist or engineer there was .73 (less than one) technician.

When one considers the emerging need for more technicians, the shortage of professional personnel and the great demand for scientists and engineers in American industry, it is judged that a ratio of 2.0 to one is a desirable objective. If as many as 100,000 scientists and engineers are needed annually, then there will be a corresponding need for as many as 200,000 new technicians annually.

The Training of Technicians

Technicians are being trained in a number of ways: Some have acquired their technical skills by learning on the job, supplementing their work experience with self study, correspondence courses and evening classes. Some have come up through the ranks of the skilled crafts and trades by acquiring special knowledge and skills. Many technicians, particularly electronic technicians, have had training in the Armed Forces. Some technicians have started training as engineers and dropped out to take jobs as technicians. Some engineers are filling technician's roles in industry because of the lack of technicians. Increasing numbers of technicians are now coming from high school and post-high school institutions whose programs are specifically designed for technician training.

In the absence of specialized schools to provide technician training, industries have been forced to employ persons with some experience and then provide them with the additional training necessary for them to fill positions as technicians.

The Armed Forces are probably training the most technicians in this country today. The increasing use of complex scientific and elec-

tronic equipment for military purposes has forced the services to develop these training programs. As men are released from the services with this type of training, they find ready employment opportunities in civilian life.

Graduate engineers have sometimes been used as technicians because of the shortage of trained technicians and also to give the engineers some practical experience in a given area of work. The shortage of engineers will probably curtail this source of technicians in the future, however.

In the face of increasing demands for technicians of all types at many levels of industrial and non-industrial work, there is a growing need for pre-employment training programs to train high school graduates for technical occupations.

Pre-Employment Training Programs

Pre-employment training programs for technicians are found in four basic types of institutions: (1) technical high schools; (2) area vocational-technical schools; (3) technical institutes; and (4) community colleges.

Technical High Schools.—Technical high schools have two general purposes; to provide pre-engineering training for those desiring to go on to collegiate engineering programs; and to provide practical technical training to those who want to enter technical-type jobs on the completion of high school. Such high schools may fulfill the needs of many students who do not desire or require as much academic work in order to be employed in elementary technician-type occupations. In general, technical high schools can play an important but not dominant role in the training of technicians for the future.

Area Vocational-Technical Schools.—These schools have two chief characteristics: they are vocational schools that provide training which leads to employment in specific occupations; and they serve students in more than one community or school district. Training programs may range from short term trade programs up to two years or more of training in such fields as electronics. These institutions play an important part in the vocational training of rural and small town youth who need vocational training. Total programs often include separate curriculums for training technicians and skilled craftsmen.

Technical Institutes.—The technical institute is rapidly becoming the institution most directly related to the training of technicians, particularly engineering technicians. In some cases these institutes exist as divisions of colleges, engineering schools or community colleges. The following points provide some of the characteristics of a technical institute.

1. It is post-high school level, but distinct in character from a college or university.
2. Its objective is to prepare persons for technician occupations, usually in engineering fields.
3. Its full-time curriculums are usually two years in length.
4. Its entrance requirements are somewhat more flexible than those of the engineering college. Although high school graduation is usually required, there is often no specification of courses required.
5. Its methods of instruction are relatively direct and involve some practice with hands and tools.

6. Its curriculums are aimed to prepare persons for employment in several closely related technical occupations in selected fields, in contrast with the broad scope of engineering programs, and in contrast with the narrow scope of skilled craft training.
7. Its curriculums may include some general education, particularly the development of communication skills and some emphasis on economics and human relations.
8. Its teachers are selected on the basis of practical experience and ability rather than on scholarly preparation alone.

In an effort to strengthen technical institutes, the Engineers' Council for Professional Development (ECPD), representing the major engineering societies of the United States and Canada, set up rather rigid accreditation standards for recognizing technical institutes as places for training auxiliary engineering personnel. Although there are more than 250 institutions in the country that offer technical programs today, only 32 institutions have had curriculums accredited by the ECPD. While the desire to strengthen technical institute programs at the collegiate level is commendable, there is also a need to broaden both the scope of the technical institute programs and the accreditation practices.

Community Colleges.—Although “junior colleges” have been in existence for some time, the term “community college,” as applied to public two-year colleges, is a fairly recent development. These institutions are beginning to play an important part in the training of technicians.

Comprehensive community colleges have the following basic functions;

1. To provide the first two years (lower division) of college for those who desire to continue with a college education.
2. To provide the college level vocational and technical education for those seeking employment in business and industry following two years of post-high school training.
3. To provide general education for adults who seek to increase civic and social and/or vocational competence.

Community colleges have added a wide variety of two-year terminal programs at the college level in order to give students the type of training now being demanded in many businesses and industries. Terminal programs in business, secretarial science, nursing, dental hygiene, drafting, electronics, mechanical technology, chemical technology, and many others have been developed alongside college transfer programs. Although terminal and transfer programs are separated in the curriculum, the joint use of facilities and some staff members makes this comprehensive institution more efficient in operation and, hence, less costly to the student and the state or locality.

In summary, there is a growing need for technicians—a group of employees that work between professional workers and skilled workers—in many areas of our economy. Technicians have been trained in many ways in the past but more and more technicians will need to be trained in special pre-employment programs in such institutions as vocational-technical schools, technical institutes and community colleges.

Chapter 2

GENERAL CHARACTERISTICS OF THE RICHMOND-PETERSBURG-HOPEWELL AREA

The Geographical Area

The geographical area encompassed in this study is the greater Richmond-Petersburg-Hopewell Metropolitan area. Political subdivisions included in the area are the cities of Richmond, Petersburg, Hopewell and Colonial Heights; and the counties of Henrico, Chesterfield, Dinwiddie and Prince George. The area comprises a total of 1,540 square miles within a radius of approximately 35 miles.

Population

In 1960, the population of the area had grown to a total of 515,179, or 23.3 per cent increase over the population total in 1950. During this same ten-year period, the population of the state as a whole increased 19.5 per cent to approximately 4 million.

The population per square mile for the Commonwealth of Virginia in 1960 was 99.6 persons; the population per square mile for the Richmond-Petersburg-Hopewell area was 334 persons. Table 1 shows the population growth and percentage of change between 1950 and 1960 for each of the political subdivisions within the area under study.

The median years of formal education for Virginians rose from 8.5 to 9.9 between 1950 and 1960. The national median was 10.6 years in 1960 as compared with a median of 10.9 years for the Richmond area.

Economic Factors

The per capita income of persons in the Richmond-Petersburg-Hopewell area ranged from a low of \$1,416 in Dinwiddie County to a high of \$2,717 in Richmond in 1960. This compares with a per capita income of \$1,848 for Virginia and a per capita income of \$2,226 for the nation in 1960. Table 2 shows the per capita income for each political sub-division for 1960.

The area's expanding economy is creating additional jobs as well as new kinds of jobs. A net demand for 18,000 additional workers in standard skill areas is forecast for this area in the present decade.

TABLE 1
POPULATION: RICHMOND-PETERSBURG-HOPEWELL AREA

	Population		Per cent Change	Per cent White
	1950	1960		Population (1960)
Richmond	230,310	219,958	-4.5	58.0%
Petersburg	35,054	36,750	4.9	57.8
Hopewell	10,219	17,895	75.2	83.3
Colonial Heights	6,077	9,587	57.8	
Henrico County	57,340	117,339	104.7	94.8
Chesterfield County	40,400	71,197	76.1	86.7
Dinwiddie County	18,839	22,183	17.8	35.4
Prince George County	19,679	20,270	3.0	76.2
Total.....	417,918	515,179	23.3%	71.6
State of Virginia	3,319,000	3,967,000	19.5%	79.2%

TABLE 2
PER CAPITA INCOME BY CITY AND COUNTY AS COMPARED
WITH VIRGINIA AND U.S. FOR 1960

Division	Amount
Richmond	\$2,717
Petersburg	1,852
Hopewell	2,587
Colonial Heights	2,608
Henrico County	2,292
Chesterfield County	2,255
Dinwiddie County	1,416
Prince George County	1,940
Virginia	\$1,848
U.S.	2,226

Employment in the Area

The Richmond Metropolitan Area represents one of the most heavily concentrated sections of the state for industrial manufacturing and distribution of manufactured products. It has enjoyed a consistently low rate of unemployment as compared with some other parts of the state and the nation at large. A brief description of each of the sub-areas in the area is provided below:

Richmond and Henrico County.—Manufacturing employs more people than any other industry. Cigarettes, food products, paper and paper products, apparel and fabricated textiles, and commercial printing are the leading types of manufacturing concerns in this area. Lumber is the chief product in the county. Richmond is a great trade center with large retail and wholesale establishments. Other important fields of business are transportation, public utilities, finance, insurance, and real estate. A relatively large number of persons in the area are employed in federal and state governments.

Chesterfield County.—Large numbers are employed in the plants of the duPont Company, Allied Chemical and Dye Corporation, and Reynolds Metal Company. In addition to chemicals, Chesterfield County concerns manufacture excelsior, lumber millwork, fiberglass boats, aluminum extrusions, foil laminated cartons, molded plastic products and foundry castings.

Petersburg and Dinwiddie County.—Dinwiddie County is primarily agricultural. Petersburg has a great deal of manufacturing, including tobacco products, luggage, furniture, clothing, lumber and millwork, optical goods, concrete products, foundry products, machines, cord and twine, drugs, pens and pencils, metal bearings, metal stampings, fertilizer and some food products. Lumber and pulpwood production are important in the county.

Hopewell and Prince George County.—Hopewell is primarily a manufacturing community, and in the county, manufacturing provides more employment than does farming. Three large plants together employ nearly 4,000 persons in the manufacture of nitrogen compounds, industrial gases, munitions, dry ice, fertilizers, folding box board, and liner board. Other manufacturers produce dyes and organic pigments, synthetic fibers, tire cord, rug cord, men's apparel, etc.

As of 1958 there were 619 manufacturing establishments in the total area. Table 3 shows the number of manufacturing plants by relative size in terms of the number of employees.

TABLE 3

NUMBER OF MANUFACTURING ESTABLISHMENTS IN THE AREA: 1958

Division	Number of Employees			Total Plants
	1-19	20-99	100 or more	
Richmond	222	100	70	392
Henrico	32	21	3	56
Chesterfield	30	8	6	44
Colonial Heights	7	2		9
Petersburg	32	14	12	58
Dinwiddie County	24	4		28
Hopewell	7	1	5	13
Prince George County	15	4		19
Total Plants	369	154	96	619

A total of 67 new plants had been established in the area between 1950 and 1962 with a 1962 level of employment of over 7,000 persons in these new plants. This growth compares with 445 new plants with a total 1962 employment of 51,925 between 1950 and 1962 for the state as a whole. Table 4 shows a summary of new plants established by county and city in the area.

TABLE 4

NEW INDUSTRIAL PLANTS SINCE 1950

County or City	Number of New Plants	Employment
		1962
Richmond	39	1,720
Henrico County	8	595
Colonial Heights	4	155
Chesterfield County	3	3,225
Petersburg	7	480
Dinwiddie County	1	115
Hopewell	3	525
Prince George County	2	215
Totals	67	7,030
Virginia	445	51,925

In summary, the Richmond-Petersburg-Hopewell area, including adjacent counties, constitutes approximately one-eighth of Virginia's population. The increase in population for this area has been slightly higher than the increase for the state as a whole. The area contains a concentration of light manufacturing including a wide variety of products and the employment rate for the area as a whole has been relatively high. New growth in the area has been approximately equal to new growth in the rest of the state.

Chapter 3

MANPOWER NEEDS IN THE AREA

Survey of Manpower Needs

In January, 1959, the Virginia Employment Commission conducted a Manpower and Training Needs Survey of the Richmond Metropolitan Area (including Richmond, Henrico County and Chesterfield County). A projection of needs for 1965 was included in the report.

In 1962, at the request of the Advisory Committee to the Richmond School Board and the State Council of Higher Education, the Commission reestimated and updated the results of the earlier survey to include projections to 1970. Firms employing less than four persons were excluded from the survey as were self-employed persons. Some occupations requiring collegiate training or less than one year of special training were omitted from the report.

Most of the occupations surveyed showed an expanding trend. In 1959, employment in the occupations selected for this study was 28,068. It is anticipated that employment in these same occupations will be 38,813 in 1970. When all factors are considered, however, the net need for new workers is 18,254.

Automation, technological changes, and mechanization are constantly creating new jobs and making others obsolete. The space age, automatic telephone dial systems, and electronic data processing equipment have all affected the Richmond labor force components in the last few years. Although no one can foresee the exact effects and changes that will occur in the next eight years, by using the past trends and experience as a guide, a heavy demand is forecast for skilled workers, such as building trade craftsmen, mechanics, repairmen, machinery operators and technicians.

Skilled Occupations.—Selected data from the Virginia Employment Commission report on skilled occupations are shown in Table 5. The list is restricted to occupations requiring at least one year of special education or formal training, or the equivalent in apprenticeship or on-the-job training. Table 5 shows the number of new workers that need to be trained annually outside of industry and exclusive of new workers to be supplied through apprentice training programs. Training programs for such skilled workers would be found in "trade" or "vocational" schools.

Distributive Occupations.—No data are available from the Employment Commission report on the numbers of new workers needed in sales and other distributive occupations for businesses in the Richmond area. With more and more emphasis being placed on appropriate training of personnel in sales, merchandising and advertising in business, these occupations will need to be included in any future determination of training program needs.

Business Occupations.—For other business occupations, however, a number of manpower needs were shown to exist in the Richmond area. Table 6 shows the unusually heavy demands for trained personnel in business office occupations. As many as 336 clerk-typists will need to be trained annually to meet the employment needs in the Richmond area alone.

TABLE 5
THE NUMBER OF EMPLOYEES THAT NEED TO BE TRAINED ANNUALLY
OUTSIDE OF INDUSTRY FOR SKILLED OCCUPATIONS

Skilled Occupations	Numbers Needed to be Trained Annually, Outside of Industry*
Sheetmetal Worker	100
Auto and Truck Mechanic	90
Brickmason	85
Carpenter ..	57
Machinist	52
Manitenance Mechanics	48
Appliance Repairman	45
Plumber—Pipefitter	35
Printing Occupations	17
Seamstress—Tailor	16
Auto Body Repairman	11
Welder	11
Chef—Cook	9
Furniture Repair—Upholstery	7
Cabinetmaker	6

* New workers to be supplied through apprentice training programs are not included in the above figures.

TABLE 6
THE NUMBER OF EMPLOYEES THAT NEED TO BE TRAINED ANNUALLY
OUTSIDE OF BUSINESS

Business Occupations	Numbers Needed to be Trained Annually Outside of Business
Clerk-Typist	336
Stenographer	185
Secretary	141
Accounting Clerk	87
Bookkeeper	83
Computer Programmer	72
Tabulating Machine Operator	23
Bookkeeping Machine Operator	18
Keypunch Operator	13

Technician Occupations. — The Virginia Employment Commission Manpower Survey revealed projected needs for technicians in only two areas. As many as 36 draftsmen and 23 laboratory (miscellaneous) technicians would need to be trained annually to meet the employment estimates between now and 1970.

Since job descriptions and job titles involving “technician-type” occupations are relatively new and undefined in the classification system used by the Employment Commission, it is not surprising that so few needs are projected in this survey. The Commission, aware of this shortcoming, has cautioned against the use of its findings to establish needs in this particular area. At the present time, the Commission is engaged in a careful review to develop a classification system that will more accurately reflect “technical-type” occupations.

The problem faced by the Virginia Employment Commission is also indicative of the problem faced by employers. With the uncertainty caused

by inadequate descriptions and definitions and the uncertainty caused by emerging occupations, employers have found it difficult to project their needs for technicians.

Although the Manpower Training Survey was limited both from a geographical standpoint (in terms of the present study) and in its projections of needs in "technical occupations," it does provide some basic information relating to the needs for certain types of vocational training programs for both secondary school level and post-high school levels. To determine the needs for "technicians," we must seek information from other sources.

Existing Needs for Technicians

Without adequate data from the Manpower and Training Needs Survey on existing and projected technician needs, it was decided that information on this point would have to come from interviews with industrial personnel.

A summary of the results of these interviews follows:

1. There is a shortage of trained technicians in the Richmond-Petersburg-Hopewell area. At the present time industrial employers are forced to go outside of the area to hire certain key technicians, particularly in chemical technology, mechanical technology, and data processing.
2. Continuing a trend of long standing, many technicians are being trained from within the ranks of industry itself. More formalized training programs would be helpful to many employers in the area.
3. Employers are looking for persons who have a good technical background in mathematics, science and some general skills in working with scientific instruments. Specialized training for particular duties can be furnished by the companies if employees have basic skills and knowledge with which to begin.
4. The relatively few technicians now being trained in this area and other areas are finding ready employment in this area. Employers say that existing programs cannot supply them with their needs.
5. Although many types of technicians seem to be in demand in varying degrees, the most frequent occupations cited included the following technical-type jobs: data processing programmers and operators, chemical technicians, electrical and electronic technicians, draftsmen, tool makers and designers, instrument makers and air conditioning technicians.
6. In addition to specialized technical education programs, many employers feel that there is a need for more general education programs in such fields as mathematics, chemistry, physics, English composition, technical writing, machine shop, public speaking and economics. Such courses could be taken by many employees to help up-grade them in present jobs or to fit them for even higher level positions with the company.
7. Employers are most concerned about finding employees who have some training and experience but who are willing to learn more and take more responsibility, particularly in technical level jobs.

Since the method of study was selective and not exhaustive of every industry or even every type of industry, the results can only be indicative. It may be concluded, however, even from this limited survey, that there are existing needs for training more technicians. If general industrial predictions are realistic, these needs will become more and more acute in the coming years.

Projecting Needs for Technicians

Without an adequate base for identifying current needs and the lack of certainty about specific future requirements for technicians it is only possible at this time to make general estimates or projections of future needs.

Some existing trends may throw light on future needs, however. For example, the trend throughout Virginia is for more skilled and technical workers. Agricultural workers declined 41 per cent between 1950 and 1962 among white males and 53 per cent among non-white males throughout the state. During this same period, professional, technical and kindred workers increased by 65 per cent among white males and 38 per cent among non-white males. Since 1950, white females in professional and technical occupations have increased by 62 per cent. Among non-white females for the same period, the increase has been 49 per cent. In Virginia, the labor force increased 17% between 1950 and 1960 with a 9% increase in male workers and a 43% increase in female workers. Thus, throughout Virginia the trend is toward more and more skilled, technical and professional workers.

Virginia is growing at a faster economic rate than most other states. Such growth and development is indicative of the attractiveness that Virginia holds for new industry. If, however, new industry is to be attracted and encouraged to settle in the state, there will need to be a supply of trained skilled and technical workers available to meet the needs of new industry.

Thus, if a number of current needs can be identified now and all indicators point to the fact that there will need to be many more trained technician-type persons for industrial and non-industrial positions in the future, we may conclude that Virginia, including the Richmond-Petersburg-Hopewell area, faces an immediate challenge that must be met—the need to provide adequate training for an increasing number of youth and adults to fit them for technical-type occupations.

The Need for Training and Employment Opportunities

In addition to determining the needs of employers for trained personnel, it is also necessary to review the needs of youth and adults who are seeking to be employed at an appropriate level and type of work so that they may contribute their optimum effort to the general economic and social community of which they are a part. More and more Virginians must have the necessary training to obtain employment and be able to advance in their chosen occupations. This will mean better paying jobs and rising standards of living for many Virginians which will be of ultimate benefit to all citizens of the state.

There is a growing respect for the status and dignity of skilled workers and technicians growing out of greater recognition of the importance of their contribution to industry and to the economy in general. Also, there is a growing awareness that the new jobs created by technological development can lead to rewarding lifetime careers.

Training of Youth.—It is estimated that only about 24 per cent of all college age (18 to 21) youth in Virginia now attend some college in Virginia. Perhaps another 10 per cent receive some type of post-high school training in area vocational schools, apprenticeship training or in other programs. This still leaves a large percentage of Virginia's youth who do not now get any type of training beyond high school. In fact, only about 53 per cent of those who reached 18 years of age even graduated from high school in 1962. In 1962, approximately 42.4 per cent of white high school graduates attended college; another 4.2 per cent attended trade schools; and another 4.2 per cent attended business schools for a total of 50.8 per cent of these graduates continuing beyond high school with some type of training. Among Negro graduates, approximately 31.8 per cent attended college and another 5 per cent attended some type of trade school.

Table 7 shows the number of high school enrollments and the number of graduates for 1961-62 by city and county within the Richmond-Petersburg-Hopewell area.

TABLE 7
HIGH SCHOOL ENROLLMENTS AND GRADUATES, 1961-62

City or County	Enrollment (Grades 9-12)			Graduates		
	W.	N.	Total	W.	N.	Total
Richmond	4,928	3,679	8,607	919	589	1,508
Petersburg	1,036	787	1,823	207	117	324
Hopewell	1,042	135	1,177	173	7	180
Colonial Heights	608		608	93		93
Henrico County	5,957	393	6,350	971	74	1,045
Chesterfield Co.	3,315	385	3,700	491	75	566
Prince George Co.	728	166	894	105	26	131
Dinwiddie Co.	426	400	826	84	64	148
Totals.....	18,040	5,945	23,985	3,043	952	3,995

Table 8 shows the percentage of high school graduates that attended college, trade school, or business school after graduation by county and city within the area under study. From these data and statewide patterns we may make the following summary statements:

TABLE 8
PER CENT OF 1961-62 HIGH SCHOOL GRADUATES IN CONTINUATION
PROGRAMS BEYOND HIGH SCHOOL

County or city	Per Cent Attending College	Per Cent Attending Trade School	Per Cent Attending Business School	Total Per Cent
Chesterfield County	40.9	3.6	3.4	48.0
Dinwiddie County	32.1	5.9	4.7	42.8
Henrico County	52.4	1.9	3.1	57.5
Prince George County	45.7	.0	.9	46.6
Colonial Heights	40.8	4.3	.0	45.1
Hopewell	34.6	9.8	4.6	49.1
Petersburg	56.5	.0	.4	57.0
Richmond	56.9	1.7	2.2	60.9

1. Approximately 3,000 18 year-olds in the Richmond-Petersburg-Hopewell area did not complete high school in 1962.
2. Of the 3,995 youths who did graduate from high school in this area, approximately 1,600 went on to college somewhere. As many as four or five hundred of these students may have gone to colleges outside of Virginia.
3. An additional three or four hundred high school graduates entered some type of vocational program in trade or business schools.
4. Less than a hundred high school graduates entered some type of apprenticeship training program.
5. Some graduates entered the Armed Services where some could receive further training.
6. Most of the 3,000 youths who did not graduate were working at unskilled jobs; some entered apprenticeship training; some entered the armed services and some took up home-making duties.
7. Thus, more than 1,200 high school graduates and as many as 2,000 youths who did not graduate in this area of Virginia received no further training beyond graduation or beyond 18 years of age. It is estimated that more than half of these youth could benefit greatly from additional vocational and/or technical training.

Training of Adults.—Some employers and educators are agreed that many workers in the Richmond area are under-employed. Although the area now enjoys a very high rate of employment, there are still many job opportunities for skilled workers, office workers, technicians, salesmen, managers and professionals.

Nearly all of the job opportunities that are unfilled and available at the present time in this area require considerable training and some experience. Employers are often forced to recruit workers outside of the area at some expense in time and money.

Many workers who are employed at one level and type of work could be employed at a higher level of work if they had the necessary training and educational background to qualify for such positions. Employers have indicated that some of their employees could qualify for higher paying and more responsible positions in their companies if some type of training program were available and employees would take advantage of such opportunities during evening or off-work hours.

The Need for Scientists and Engineers

Industries and businesses in the Richmond-Petersburg-Hopewell area have been able to attract a fair number of scientists and engineers over the past several years. Some companies specialize in research and development. More such industries could be attracted to the area if there were more opportunities for training in advanced scientific and technological educational programs. Industries concerned with research and development seek localities where collegiate programs in advanced technology provide library facilities, faculty consultation and opportunities to keep abreast of new scientific developments or opportunities to continue education toward advanced degrees.

The Virginia Employment Commission has estimated that there will probably be a need for at least 3,500 scientists and engineers in the

Richmond area by 1970 as compared with about 2,595 in selected professional occupations in 1960. Table 9 shows a comparison of estimated needs for 1965 as compared with estimated numbers of scientists and engineers in 1960.

With but few exceptions, Richmond area companies and industries have been able to recruit an adequate number of scientists and engineers. This has been accomplished, however, only at great expense and effort. It would be easier to attract scientists and engineers to the Richmond-Petersburg-Hopewell area if there were more adequate collegiate and graduate science and technology programs.

TABLE 9
ESTIMATED NEEDS FOR ENGINEERS AND SCIENTISTS IN RICHMOND
AREA BY 1965

Classification	Estimated Numbers	
	1960	1965
Architect	106	129
Bacteriologist	16	17
Chemist	359	424
Engineer—Chemical	74	82
" —Civil	711	849
" —Electrical	321	380
" —Industrial	194	241
" —Mechanical	474	571
" —Other	130	160
Geologist	16	25
Mathematician	10	12
Pharmacist	42	55
Physician	117	134
Physicist	13	13
Radiologist	12	14
Totals	2,595	3,106

The fact that Virginia already has several centers of science and technology and the fact that such centers are costly to duplicate would tend to prevent the complete development of such a center in the Richmond area. In view of continuously expressed needs and potential benefits of such programs, however, it is probable that much more can be done to utilize the existing resources of both private and public institutions of learning and research now located in this area to provide more opportunities for advanced work in science and technology.

Chapter 4

EXISTING TRAINING AND EDUCATIONAL PROGRAMS

On-The-Job and Apprenticeship Training

On-the-Job Training.—Although no precise figures are readily available, it is estimated that at least several thousand workers in the Richmond area industries and businesses are receiving some type of on-the-job training ranging from special short-term orientation courses to rather extensive long-range training programs. One plant alone (DuPont-Spruance Fibers Plant) provided training programs or opportunities for more than 800 of its 2300 employees during 1962. Some employees that have received general pre-employment training are given specialized training for particular duties within the plants where they work. While industry finds it necessary to provide some of this highly specialized training within its own plants, there is a growing need for more training to be done outside of the plant and prior to the time a person is employed.

Apprenticeship Training.—Each year hundreds of persons receive training through apprenticeship training programs where they work under the guidance and direction of master craftsmen and skilled trades workers. In the Richmond area at the present time there are 386 programs and committees offering employment in 112 trades that have been approved by the Virginia Apprenticeship Council. Although some of these trades have limited openings, there is a wide variety of such programs available. The following listing groups some of the more common trades and indicates the number of programs available:

1. *Construction Trades*

Sheet Metal Worker	23 programs
Iron Worker	6 programs
Electrician	21 programs
Masonry Trades (4 trades)	28 programs
Painter and Paper Hanger	29 programs
Plasterer and Lather	13 programs
Pipe Trades (3 trades)	16 programs
Carpentry (2 trades)	25 programs

2. *Service Trades*

Automotive Trades (6 trades)	102 programs
Truck and Diesel Mechanic (3 trades)	9 programs
Electrical Repair (3 trades)	15 programs

3. *Manufacturing Trades*

Metal Trades (3 trades)	29 programs
Graphic Arts (printing) (14 trades)	118 programs
Woodworking Industry (4 trades)	36 programs
Draftsman	12 programs
Foundryman (2 trades)	8 programs
Millwright	1 program

Some of the trades listed above have well-established programs and excellent training standards. Other trades are seeking to improve training programs and broaden opportunities for training. There has been very little demand and limited training through apprenticeship in the following

trades: food trades (cook, baker, meat cutter, etc.), opticians (lens grinders), sewing machine mechanics, airplane mechanics, photographers, mattress makers, watchmakers, and glaziers.

While on-the-job training opportunities may occur in any type and level of occupation—semi-skilled, skilled, technical and professional—the apprenticeship training programs are limited to the semi-skilled and skilled occupations.

Vocational Programs in High Schools

A number of high school students in this area are now receiving training in skilled trades and some elementary technical occupations.

Business and Distributive Education Programs.—In the high schools of the four counties and four cities included in this area study, there were as many as 7,352 high school students enrolled in some type of business or distributive education courses in 1961-62. A summary of such enrollments is shown in Table 10.

TABLE 10
ENROLLMENT IN DAY VOCATIONAL COURSES
IN BUSINESS AND DISTRIBUTIVE EDUCATION: 1961-62

County or City	Business			Distributive		
	W.	N.	Total	W.	N.	Total
Chesterfield County	988	138	1126			
Dinwiddie County	202	112	314			
Henrico County	1262	164	1426	21		21
Prince George County	325	56	381			
Colonial Heights	269		269			
Hopewell	454	62	516	30		30
Petersburg	463	260	723	32	34	66
Richmond	1565	790	2355	94	31	125
	5528	1582	7110	177	65	242

An additional 1,745 adults were enrolled in evening classes in business and distributive education in two of the cities in the area. A summary of these enrollments is shown in Table 11.

TABLE 11
ENROLLMENT IN EVENING ADULT CLASSES IN BUSINESS AND
DISTRIBUTIVE EDUCATION: 1961-62*

City	Business			Distributive		
	W.	N.	Total	W.	N.	Total
Petersburg	73	29	102	54		54
Richmond	733	112	845	744		744
Totals	806	141	947	798		798

* No enrollments reported for other cities and counties.

Full-time High School Training in Skilled Occupations.—A total of 421 high school students received full-time training in skilled occupations in six of the high schools in the area during 1962-63. A summary of enrollments by school and by trade is shown in Table 12.

TABLE 12

**ENROLLMENT IN FULL-TIME HIGH SCHOOL TRAINING PROGRAMS
IN SKILLED OCCUPATIONS: 1962-63**

Enrollment by School							
Occupation	Armstrong H.S.-Rich.	Peabody V.M.I.	Va. Rand. H.S.-P.	Maggie H.S.-Hen.	Ptsbg. Walker	H.S.	Total
For Boys:							
Auto mechanics	71	44	14	17			146
Commercial foods					22		22
Masonry			19	12	38		69
Tailoring					35		35
Electricity-electron.		16	15				31
Drafting						16	16
Machine shop		18					18
Shoe repairing					12		12
Totals	71	78	48	29	107	16	349
For Girls:							
Beauty culture					34		34
Clothing					22		22
Commercial foods					10		10
Tailoring					6		6
Totals	—				72		72

In addition to full-time high school training programs in the area high schools, as many as 1,724 adults were enrolled in evening trade and technical extension courses during 1962-63. A summary of these enrollments by school and by course is shown in Table 13.

TABLE 13

ENROLLMENT IN EVENING TRADE AND TECHNICAL EXTENSION COURSES:
1962-63

	Virginia Mech. Inst.	Maggie Walker H.S.	Armstrong H.S.	George Wythe H.S.	Richmond Prof. Inst.	Adm. Annex Petersburg	Petersburg H.S.	Hopewell H.S.	TOTAL
Auto transmissions	8	—	—	—	—	—	—	—	8
Auto mechanics	94	—	21	—	—	—	—	—	115
Blueprint reading	48	—	—	—	—	—	—	—	48
Building estimating	12	—	—	—	—	—	—	—	12
Carburetion-ignition	33	—	—	—	—	—	—	—	33
Drafting	62	—	7	—	62	—	—	—	131
Electricity	101	—	25	—	20	—	38	—	184
Electronics	122	—	—	—	—	—	—	—	122
Front end alignment	10	—	—	—	—	—	—	—	10
Machine shop	54	—	—	—	—	12	12	30	108
Oil burner service	59	—	—	—	—	—	—	—	59
Refrigeration/air cond.	63	—	—	—	—	—	—	—	63
Sheetmetal work	30	—	—	—	—	—	—	—	30
Shop mathematics	17	—	—	—	—	—	—	20	37
Welding	78	—	—	—	—	—	—	—	78
Motor controls	23	—	—	—	—	—	—	—	23
Masonry	—	29	—	—	—	—	—	—	29
Tailoring	—	12	—	—	—	—	—	—	12
Plumbing	—	30	—	—	—	19	—	—	49
Police training	—	—	—	28	—	—	—	—	28
Plastics	—	—	—	—	15	—	—	—	15
Technical mathematics	—	—	—	—	82*	—	—	—	82
Instrumentation	—	—	—	—	19	—	—	—	19
Construction contracting	—	—	—	—	14	—	—	—	14
Technical drafting	—	—	—	—	54*	—	—	—	54
Materials of construction	—	—	—	—	19*	—	—	—	19
Mechan. equip. of bldgs.	—	—	—	—	28*	—	—	—	28
Structures	—	—	—	—	28*	—	—	—	28
Hydraulics	—	—	—	—	6	—	—	—	6
Properties of materials	—	—	—	—	19*	—	—	—	19
Mapping and surveying	41	—	—	—	—	—	—	—	41
Refrig./Air cond. technology ..	35	—	—	—	—	—	—	—	35
Electronics technology	45	—	—	—	16*	—	—	—	61
Industrial chemistry	—	—	—	—	—	—	40	—	40
Beauty culture	—	31	—	—	—	—	—	—	31
Dressmaking	—	19	34	—	—	—	—	—	53
Totals.....	935	121	87	28	382	31	50	90	1,724

* Enrollments of 97 women included in these technical courses:

Industrial Cooperative Training.—More than two hundred high school juniors and seniors over 16 years of age received training in an industrial cooperative training program during 1962-63. There were eight such programs in the area during that year that provided work experience for one-half of each school day for each student enrolled. The other half of the day was spent in appropriate high school classes. Table 14 shows the number enrolled in each of the cities or counties in the area.

TABLE 14
ENROLLMENT IN INDUSTRIAL COOPERATIVE TRAINING PROGRAMS
1962-63

	Male	Female	Total
Richmond (2 programs)	26	29	55
Petersburg (2 programs)	24	15	39
Hopewell (1 program)	16	14	30
Chesterfield Co. (1 program)	15	7	22
Henrico County (2 programs)	40	17	57
Totals	121	82	203

Practical Nurse Training.—High school students and adults may receive training as practical nurses through cooperative programs with hospitals and schools. High school seniors receive nine months of pre-clinical instruction for three hours daily followed by eight months of clinical training after graduation from high school. As many as 108 persons were enrolled in this type of training in Petersburg and Richmond during 1962-63. Table 15 shows these enrollments.

TABLE 15
ENROLLMENT IN PRACTICAL NURSE TRAINING PROGRAMS: 1962-63

	Adults	High School	Total
Richmond	67	26	93
Petersburg	15		15
Totals	82	26	108

Some New High School Programs.—In the past few years several high schools in the Richmond-Petersburg-Hopewell area have begun to experiment with vocational-technical subjects for juniors and seniors in order to better prepare them for some type of occupation upon leaving high school or at least exposing students to this type of training for a few hours each week along with their regular high school subjects. These new programs include the following: machine shop, electronics and medical assistants at Petersburg High School; electronics and machine shop at Hopewell High School; and electronics at Hermitage High School in Henrico County. Thus far, the development of such training programs appears to be meeting a real need.

Adult Education.—In addition to the many evening trade and technical extension courses open to adults in the area, a large number of adults are taking advantage of general courses in high school subjects in order to complete requirements for a high school diploma or to assist them in finding better employment. The Richmond City Schools have been offering such programs for some years with increasing interest and participation. In the past year, Henrico County has begun to offer a few programs of this type.

Private Schools.—There are at least 17 private schools now operating in the Richmond area, offering training in cosmetology, barbering, business and secretarial subjects, public speaking and automobile driving. As many as 1,200 persons have been registered in these schools at any one time

in the past year. For the most part these schools provide post-high school training in a variety of service vocations, however, the courses are open to adults who have not graduated from high school in many instances.

Post-High School Educational Programs

Several post-high school educational institutions in the Richmond-Petersburg-Hopewell area now offer a variety of training programs in vocational and technical subjects. Richmond Professional Institute offers terminal programs in business and secretarial science. Richard Bland College in Petersburg is also offering several courses in business and secretarial science. Virginia State College in Petersburg has a School of Industries that offers auto mechanics, barbering, carpentry, commercial foods, electricity, masonry, radio and television, sheet metal, tailoring and plastering. These trade programs constitute one of the eight area vocational-technical schools in Virginia, although it is sponsored by Virginia State College.

Technical Education.—The only post-high school technical training program now being offered in the area is that at Richmond Professional Institute where three general areas of training are offered: civil and highway drafting, electrical and electronic technology, and drafting technology. Enrollments in these programs for 1962-63 are shown in Table 16.

The Medical College of Virginia has programs in medical technology and x-ray technology as well as programs in practical nursing and collegiate nursing.

TABLE 16
ENROLLMENT IN FULL-TIME TECHNICIAN TRAINING PROGRAMS AT
RICHMOND PROFESSIONAL INSTITUTE, 1962-63

Program	Enrollment
Civil and Highway Technology	12
Electrical and Electronic Technology	53
Drafting Technology	30

The graduates of the School of Technology at the Richmond Professional Institute appear to be in great demand. More graduates could be placed than can be produced in the limited facilities and space now available in the School. The institution is now giving thought to the enlargement of the program in terms of more space, more staff and more programs.

Graduate Education.—Opportunities for advanced education in science and technology in the Richmond area are limited to the following programs: master's degree work in Chemistry at the University of Richmond (private institution); master's degree in mathematics, physics and chemistry at Virginia State College (public institution for Negroes); doctor's degree programs in biological and medical fields at the Medical College of Virginia (public institution); and a limited number of courses through extension work offered by the University of Virginia (public institution). Although some courses have been offered through extension in recent years, many have failed to enroll sufficient numbers of students or classes have had to be cancelled for lack of qualified instructors.

There continues to be some demand for more advanced programs in science and technology at the graduate level in the Richmond-Petersburg-Hopewell area. If this demand is to be met, it will require some type of organized cooperative effort among the educational and research institutions in conjunction with representatives from business and industry in the area. The Virginia Institute for Scientific Research, a private research institute, is a very valuable asset in this regard because of its library, staff and continuing interest in scientific developments.

