National Manpower Council

EDITOR'S NOTE: On May 18 the statement on Scientific and Professional Manpower was published by the National Manpower Council. This survey and recommended policy are so significant for the consideration of all scientists and so thought-provoking that it seems highly desirable to print the following summary.

THE REPORT of the National Manpower Council[1] is the first comprehensive survey of problems and policies in the field of scientific and professional manpower.

It consists of (1) a policy statement by the Council itself that illuminates new and challenging issues of public policy affecting the development and utilization of highly trained manpower, and (2) twelve chapters of facts and issues prepared by the Council's research staff.

The policy statement contains five stated objectives and fourteen recommendations designed to help insure adequate resources of scientific and professional manpower for the nation.

Although better use of existing skills and the development of more potential capacities from undeveloped areas of wasted human ability are considered, the report makes it clear that there is no simple or magic formula for providing the United States with the highly trained brainpower it needs.

The report is a distillation of far more than the activities of the Council's seventeen members, and of its research staff, directed by Eli Ginzberg; indeed the Council has benefited immeasurably from the remarkable response of hundreds of scientists, professional men, and leaders in government, education, business, labor, and industry. The help of three major business groups, seventeen departments of the Federal Government, seven professional groups, and 117 individuals eminent in their own fields are specifically acknowledged in the foreword.

Even so, the Council considers the report exploratory rather than definitive. "Our objectives have been," writes Chairman James D. Zellerbach in the Preface, "to frame the problem, to identify its most important facets, to evaluate the existing evidence, to indicate the lines of policy where the evidence appears adequate, and to suggest where additional research and evaluation must be undertaken before a balanced judgment can be reached."

BACKGROUND

The National Manpower Council is a non-profit citizens' survey group established at the Columbia University Graduate School of Business with a Ford Foundation grant in April, 1951. The members were invited to serve by General Eisenhower to provide—in his own words at the time—"a continuing appraisal of America's manpower resources in a period of enduring emergency." The fulfillment of that objective involves identifying and evaluating areas of significant manpower wastage, determining methods of improving the utilization of human resources, and recommending ways of developing potential resources.

The Council's first report was issued in April, 1952, under the title *Student Deferment and National Manpower Policy*. The current study is its second. A third study, now in progress, is devoted to long-range problems involved in developing an adequate supply of technical and skilled workers.

Although General Eisenhower, as commander of SHAPE, was on leave from Columbia at the time, from Paris he took a hand in helping to organize the Council because of his active interest in the whole concept of a human resources research program at the University. He had already established there the Conservation of Human Resources Project and had encouraged the developing leadership of the University in this area. Thus, he quickly accepted the challenge for Columbia when the possibility of establishing a manpower council there was being explored by the Ford Foundation.

"My hopes are especially high," General Eisenhower said later in his farewell message to the alumni of Columbia, "for the help which will come to the new administration from our . . . National Manpower Council." He added that the research would continue to command his "active interest and encouragement," a pledge refulfilled by his reception of the Council members at the White House on May 18.

RECOMMENDATIONS

The National Manpower Council on the basis of this study believes that "there is no magic formula to insure that the United States will have adequate resources of scientific and professional manpower to meet its needs." It continues, "Nothing short of a determined cooperative effort involving government, industry, educational institutions and professional and other groups will attain this goal."

Such a cooperative effort, supported by informed public opinion, the Council adds, must achieve the following five broad and related objectives: (1) to develop more reliable knowledge about our human resources; (2) to strengthen the institutions which educate and train our scientists and professionals; (3) to maintain a continuous large flow of students through our colleges and universities; (4) to expand the oppor-

[1] *A Policy for Scientific and Professional Manpower.* Prepared by the Research Staff of the National Manpower Council. New York: Columbia University Press (1953).

tunities for capable young persons to secure a higher education; and (5) to improve the utilization of the available supply of scientific and professional personnel.

To achieve the first, the Council recommends: (1) that foundations and universities encourage and support research designed to increase our understanding of educational and career choice processes, of the factors facilitating the development of talent and intellectual ability, and of the conditions contributing to superior performance; (2) that private and governmental agencies concerned with the development and utilization of scientific and professional manpower intensify their efforts to collect and analyze significant information about these critical resources; and (3) that the Federal Government, because of its specific responsibilities and unique facilities, provide leadership for these cooperative tasks, under the guidance of the Office of Defense Mobilization.

To attain the second objective, the Council recommends: (1) that state and local governments, alumni, business, labor, and other interested groups and individuals intensify efforts to provide the financial support required for the improvement of faculties and facilities; (2) that the President appoint a commission composed of Government, university, and industrial representatives to review the impact of governmental research and development contracts upon the primary responsibilities of universities and colleges to advance fundamental knowledge and train tomorrow's scholars and scientists; and (3) that institutions of higher education recognize that a dynamic society requires the kind of education and training that equips students to meet not only the demands of their first jobs but also the challenges of new tasks and problems which they will face many years later.

For the third objective, to help maintain a continuous flow of students in colleges and universities, the recommendations are: (1) that the public continue to support the present student deferment program and that the President remove dependency, except in hardship cases, as a ground for deferment to insure that postponement of service does not become exemption;[2] (2) that the Secretary of Defense direct the Secretaries of the three armed services to provide sufficient flexibility in their policies governing the calling to active duty of students enrolled in ROTC programs so that well-qualified students are permitted to pursue graduate work prior to their military service.

The fourth objective, to help expand higher education opportunities for capable young people, requires: (1) that the public and elected officials fulfill their responsibility to maintain good elementary and secondary schools by providing the financial and personnel resources needed to remedy present weaknesses in the educational system; (2) that schools, professional societies, governmental agencies, and other interested groups act together to strengthen high school and college information and counseling services to insure sound selection of schools, courses, and careers; (3) that scholarship and fellowship programs supported by private and public funds be maintained and expanded to help more young people of ability to acquire a higher education.

For the last objective, to improve utilization of available scientific and professional personnel, the Council recommends: (1) that the President initiate a review of legislation and administrative procedures governing the recall of reservists to active duty in order to develop a system of providing civilian participation in determining the distribution of scientific and professional personnel required to meet civilian and military needs; (2) that management intensify its efforts to determine the most effective balance among the different types of manpower it employs in order to insure efficient and economical operations and to provide for the further training of the manpower for which it is responsible; and (3) that business and government intensify their efforts to develop executives who understand the importance of insuring that each highly trained employee has the opportunity to utilize his capacities as fully as possible.

Findings

In arriving at these fourteen major recommendations on the five objectives, the National Manpower Council developed basic findings in its policy statement, the highlights of which follow:

1) Scientists and professional people have been increasing twice as fast as the total population since 1900, but our 155,000 scientists today still constitute only two-tenths of 1 per cent of the total working population—and only 15,000 of these are devoting themselves to fundamental research essential to opening new frontiers of knowledge. Thus, the country's economic and social well-being and its continued progress depend to a striking degree on a small group of men and women in scientific and professional fields.

2) Numerically, according to some available studies, there is a shortage of 25,000 new engineers and 65,000 qualified elementary school teachers right now. Although there is no commonly accepted estimate of the current shortage of doctors, because there is no agreement on a standard of medical care or the number of doctors required to provide any given level of medical care, the President's Commission on the Health Needs of the Nation estimated that the counrty will be short from 22,500 to 45,000 physicians by 1960. There is little point in estimating the numerical shortage of physicists whose great importance to national security makes even a small shortage particularly critical.

3) In actual fact, there is little to be gained in trying to assess some shortages quantitatively. Quality is the key. Some shortages, of course, involve unfilled demands for hundreds or even thousands of qualified personnel, but many others consist of a lack of a few individuals who possess rare and unusual qualities.

4) Moreover, analysis of manpower shortages, their

[2] A similar recommendation is contained in the Council's report on Student Deferment published last year.

causes, significance and remedies, is hindered by grossly inadequate basic information concerning demand, supply, and utilization. A complete theoretical framework for analyzing manpower shortages still remains to be developed.

5) The emergency created by Communist aggression in Korea provides the key to many current shortages. Others have a longer history, going back a decade or more. Shortages of engineers and scientists are the result of demands produced by superimposing a program of partial mobilization on a civilian economy operating at a high level of employment. These shortages have delayed defense production, slowed progress on research and development projects vital to our security, and resulted in the production of some military items costly to operate and maintain. The recent enormous strides in nuclear physics and electronics have created higher demands for scientific personnel in industry. Also private industrial research, growing now for several decades, is bringing about greater practical application of scientific discoveries which increases the use of scientists by industry.

6) The teacher shortage goes back more than a decade. Attractive opportunities in private industry, the relatively low salaries and prestige of teachers, and the impact of World War II adversely affected the growth of supply of teachers. Few communities have been sufficiently far-sighted or resourceful to protect their supply of competent teachers. The spectacular growth of new industrial and suburban areas has also created unusual demands for more teachers.

7) In the medical field, an uneven distribution of doctors throughout the country has been a shortage factor while higher standards of health and a growing national income have increased the demand for medical service. At the same time, the capacity and admission requirements of the medical schools have limited the total number of doctors trained each year.

8) The future supply of scientists and professional people is directly dependent on college enrollments. The low birth rate of the 1930's and today's military manpower policies mean that not until the closing years of this decade will there be a substantial increase in the population of college age and in the number of college graduates. Meanwhile, all the signs point to a continuing strong demand for scientifically and professionally trained manpower. Even the termination of Korean hostilities would not end the cold war, and the consumption of educational, health, and other services provided by professional personnel is likely to increase even if genuine peace is established, because of the productivity gains and growing national income promised by continuing advances in science and technology.

9) Scientists and professional persons cannot be stockpiled like commodities against future shortages. Demands for them can fluctuate sharply and unpredictably. The supply can only change relatively slowly. The problem of preventing manpower shortages in a democratic society is complicated by major influencing factors which cannot be readily controlled, such as the dynamic character of modern science, economic trends, irregularities in the birth rate, and values affecting individual career decisions.

10) But the nation can follow two broad courses of action in attempting to prevent future shortages: (*a*) an effort to alter the distribution of young people among fields of scientific and professional study to increase the total of those preparing for work in anticipated shortages areas; and (*b*) an effort to expand the size of the whole college population so that more young men and women can be trained in each field.

11) The first possibility has the advantage, if energetically pursued, of producing results in a relatively short time with more students being induced to choose careers in fields such as engineering, physics, chemistry, industrial management, or teaching where shortages are now felt and long-term shortages are feared. But if the total college population remains stable, alterations in the distribution of students will mean growth of some fields at the expense of others. If able students are channeled into scientific and technological fields, the social sciences and the humanities will inevitably suffer. Thus, schools, professional societies, employers and others inducing young people to select particular fields of study assume serious responsibilities. Hasty and uninformed career decisions involve serious waste of individual abilities and community resources.

12) The second course of action would expand the source of supply from which the nation's scientists and professional persons come and would help to reduce the loss represented by the failure to train many able individuals. There are many more young men and women in the nation capable of profiting from higher education than are currently obtaining it. Today, only half of those capable of acquiring a college degree enter college. About two-fifths of those who start—many with superior ability—do not graduate. For every high school graduate who ultimately earns a doctoral degree there are twenty-five others who have the intellectual ability to do so but do not.

13) Three readily identifiable groups in the reserve of those capable of pursuing advanced education are: (1) high school graduates who do not enter college, (2) those who start college but do not graduate, and (3) those who graduate but do not pursue post-graduate training.

14) In addition, there is a hidden reserve that is composed of capable individuals who achieve low scores on tests of intellectual ability primarily because of serious deficiencies in their early schooling. They live for the most part in poor communities which spend little on education and are found particularly among such racial and ethnic minorities as Negroes and Spanish-speaking Americans. While barriers limiting their educational and occupational opportunities have been substantially reduced in recent years, many Negroes are still handicapped by poor education in

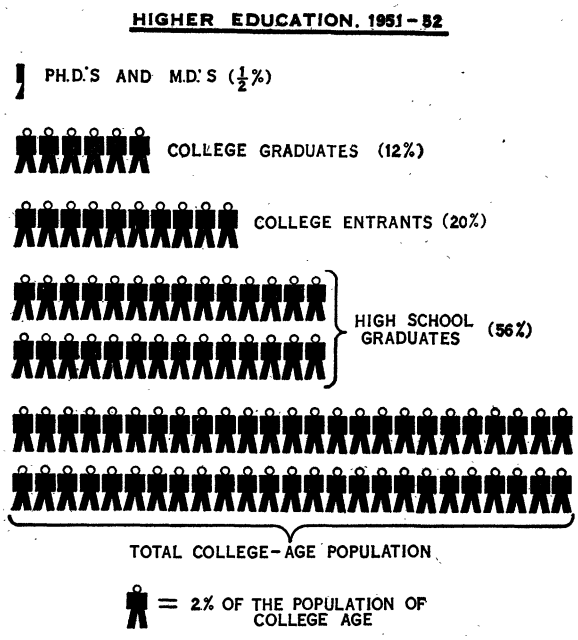

FIG. 1.

early life, and others are frequently prevented from using the skills they do acquire by discriminatory employment practices.

Growth of the Professions. Since 1870, professional and related workers have increased from half a million to about 5 million and from 3 per cent to 8 per cent of the labor force. Scientific and technical workers have increased more rapidly than any other professional group.

Since 1890, the proportion of young people completing high school has risen from 3½ per cent to almost 60 per cent. The proportion completing college has increased from 1 per cent to 12 per cent. Since the record class of 434,000 college graduates in 1950, the number of graduates has been declining, and will not begin to increase again until 1955 or 1956. The current decline is one basis of the concern over future shortages of scientific and professional manpower.

Since 1900, the number of master's degrees granted each year has risen from 1600 to 63,000. The number of Ph.D. degrees has increased from under 400 to about 7700. Over half of all Ph.D. degrees are now granted to students of the natural sciences.

Training and Occupational Distribution. The number of people who attend college depends largely on social attitudes toward the value of education. The number in each field of study is determined mainly by individual decisions based on preferences concerning the kind of work and life the individual wishes to have. Rapid changes in the supply of professional and scientific groups are difficult to achieve.

Because professional and scientific workers who are independent practitioners or employees of industry generally earn more than employees of non-profit institutions, schools and colleges, hospitals, and government agencies frequently encounter great difficulty in keeping or enlarging their staffs in periods of high employment and inflation. Under these circumstances, non-profit institutions are likely to lose first-rate personnel.

Discriminatory barriers against racial and ethnic groups and against women have been greatly reduced, but they still severely limit the number of Negroes and women in scientific and professional work. Few Negroes graduate from college, chiefly because their primary and secondary education often does not qualify them for or interest them in college.

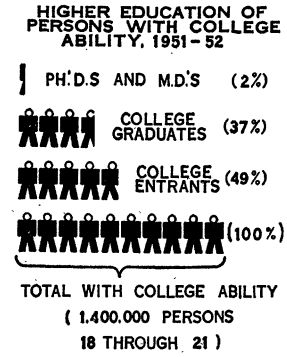

FIG. 2.

Potential for Higher Educaton. The nation has a vast reservoir of highly intelligent young people who are not pursuing their education beyond high school; only half of those with college ability enter college.

There is also a great reserve of highly able college graduates who do not undertake study for advanced scientific and professional degrees; only 4 per cent of college graduates earn a doctoral or an M.D. degree.

Finally, the utilization of these reserves for higher education is not a simple matter; many with high ability are able to secure remunerative employment which does not require advanced education.

Research and Development. In 1952, $3.5 billion, 1 per cent of the national income, was allocated for research and development. Only 160,000 of the nation's 700,000 scientists and engineers were engaged in research and development work, and only about 15,000 were engaged in basic research.

The Federal Government provided three-fifths of the total expenditures. The government does not spend more on research and development to improve the nation's defenses mainly because of the shortage of competent scientific and engineering personnel.

Too large a part of the governmental program is directed toward minor improvements in military equipment while the major need is for more radical approaches to the defense potential of modern science and technology.

Many members of scientific faculties in the universities are preoccupied with administering government projects, and many graduate students are working on narrow assignments on narrow projects. There is a

real danger that today's development work is being accomplished at a high cost in terms of the future quality and flexibility of the nation's scientific manpower and the advancement of basic knowledge.

Armed Forces and Highly Trained Manpower. In building its strength to 3.6 million after the outbreak of hostilities in Korea, the armed forces took from the civilian labor force a small but important number of highly trained individuals, including scientists and professionals.

Since the armed forces had no well-developed personnel classification and assignment procedures by which individuals with scarce skills could be immediately identified and placed in the work best suited to meeting military requirements and to using the special abilities of individuals, a certain amount of malutilization resulted. In recent months, however, all the military services have developed specific policies and procedures which, if carried out, will assure the proper assignment of these key individuals.

Most of the men entering military service for the first time are young men with little training and experience. In order to obtain the substantial numbers of scientists, professional and semiprofessional personnel, and especially of trained technicians which a modern military establishment needs, all the services operate training programs which are enormous in scope. Of the men entering service, some 35 to 65 per cent (depending on which service they enter) must receive special training. Since few men remain in military service after their first period of service, the civilian economy receives much of the benefit of this training.

Nature of Manpower Shortages. A manpower shortage cannot be evaluated without consideration of alternative ways of raising production of one type of goods or services and of society's needs for other types of goods or services which are produced with the same scarce resources.

Manpower shortages are different from commodity shortages since the supply of trained people cannot be increased rapidly, stockpiled, rationed, or shipped to wherever it is needed, and because of vast differences in the competence of individuals.

The only quick remedy for manpower shortages lies in improvements in utilization that stretch the available supply. During the present period of partial mobilization, however, the nation is not disposed to accept compulsory manpower or production controls. Currently, cost-plus contracts, federal tax policies, and inflation encourage inefficient utilization of manpower.

Persistent shortages of scientific and professional manpower cannot generally be relieved without efforts to increase the supply by expanding educational facilities and increasing the numbers who are financially and intellectually capable of completing training and have the desire to do so.

Increasing the supply will not automatically solve shortages in many fields. Shortages of teachers, of nurses, and of doctors for salaried positions, for instance, will not be remedied unless employment in these fields is made much more attractive.

The Engineering Profession. Since Korea there has been a widespread shortage of engineers caused by increased defense expenditures, coupled with a reduced supply of new graduates. The shortage has been intensified by efforts of employers to stockpile engineers against future shortages.

The demand for engineers is subject to wide variations with changing business conditions. Although defense expenditures will probably level off in the near future, continued high levels of private investment mean that, barring a severe recession, the total demand for engineers will continue strong.

The demand for engineers is a demand for men to perform a wide variety of functions from top management down to routine testing. Thus, shortages of both sub-professional technicians and of competent administrators have increased the demand for engineers. Although it is estimated that industry can use from 3 to 5 technicians for each engineer it employs, the number of engineers who graduate from college each year is far greater than the number of technicians who graduate from recognized technical schools.

Although industry needs executives with a technical background, executive employment may not make full use of the engineer's training. If liberal arts and business colleges were to include some measure of technical training in their curricula, industry could have a large additional source of supply to draw upon to fill management and sales positions.

Physicists. There are fewer than 20,000 physicists in the United States, and only 4000 who have doctoral degrees. Although the number with doctoral degrees has increased steadily since 1900, the expansion is limited by the very high intelligence required, by the fact that relatively few people are attracted to scientific research careers, and by the fact that many high schools do not provide their students with adequate training in mathematics or with an introduction to the qualities of natural science.

There is now a shortage of physicists with all levels of training to assist in translating new scientific developments into the field of engineering. This shortage can best be relieved by providing additional mathematical and scientific training for engineers.

There is also a shortage of mature physicists to supervise applied research projects for industry and the government. There is no substitute for the experience which comes with time in relieving this shortage.

There is always a shortage of first-rate minds capable of making major scientific advances. The security of the nation depends as never before upon creating the conditions which will encourage fruitful basic scientific research.

Teachers. Every community can get as many teachers as it wants by sacrificing its standards of quality. In 1952, there were approximately 64,000 "emer-

gency" teachers, that is, persons with inadequate academic preparation according to existing standards.

Although part of the shortage of qualified teachers is caused by the rise in the birth rate during the early 1940's, the unattractiveness of the profession itself is a basic cause. Low salaries deter bright students, especially men, from entering the profession. The resulting predominance of women, many of whom teach for only a few years, further aggravates the shortage. The limited curricula and relatively poor mental ability of students in many teachers' colleges further deter bright students from entering training.

In attempts to relieve the present shortage strong emphasis has been placed on stop-gap measures such as emergency certificates, and advertising appeals to former teachers to return to the schools. These measures do no more than touch the surface of the problem.

Many states have tried to remedy the shortage through basic measures such as increasing state aid to local school systems to give greater flexibility to school budgets and by seeking to improve the quality of teacher training.

To be successful, such basic measures must be part of a coordinated program. Although few other measures will be effective without an improvement in the salary structure, neither can salary increases alone be relied upon to raise both the quantity and quality of the nation's teachers.

Physicians. Although there is widespread agreement that there are shortages of particular kinds of doctors for specific functions, there is no agreement on how many doctors the country now needs. It has been estimated by The President's Commission on the Health Needs of the Nation that the country will require from 22,500 to 45,000 more physicians than it will have in 1960.

A more rapid increase in the number of medical school graduates would help to reduce many health deficiencies in the population and to relieve the exceedingly long hours and hard work of many doctors.

Increasing the number of doctors trained requires an increase in the capacity of the medical schools. A substantial increase in their capacity is made difficult by the high cost of medical training, the shortage of teachers and of clinical material, and the necessity of maintaining the quality of training.

Increasing the number of doctors will not in itself solve some of the most serious shortages such as those in rural areas, for salaried positions, and for the practice of various specialties.

Improved medical care can also be brought about by improving the utilization of the existing supply of doctors through the employment of additional auxiliary personnel and other measures.

Manpower Policies in a Democratic Society. Because of the international situation, the Federal Government now has a heavy responsibility to develop within its authority new approaches to long-range manpower policies.

The basic information for the solution of many manpower problems is not available. A theoretical framework for the analysis of manpower shortages, and better knowledge of the factors which influence the supply of scientific and professional personnel are especially needed.

A democratic society must rely on voluntary and primarily indirect methods for attaining its manpower goals. The creation of conditions which will make for a reasonable balance between the supply of and demand for highly trained manpower can only be the product of a vast cooperative undertaking.

An important part of the solution must be the development of a more sympathetic climate for intellectual endeavors which will make them attractive to able young people.

News and Notes

First Palynology Conference

THE First Palynology Conference was held at Yale University on February 21, 1953. The purpose was discussion of current investigations being carried out principally on the North American continent by workers in the field of microfossil research. Although originally outlined as a local meeting between the group at the University of Massachusetts, headed by L. R. Wilson, and that at Yale, the plan was enlarged to include the majority of workers in the United States. Seventeen papers were presented and informally discussed during two sessions. Those concerning research being undertaken on Pleistocene material were presented during the morning session, but in the afternoon, the papers were for the most part concerned with pre-Pleistocene studies. Paul B. Sears presided at the morning gathering, and Edward S. Deevey, Jr., presided during the afternoon.

Participants, their affiliation, and titles were as follows in the order of their presentation:

Stanley A. Cain, University of Michigan: "The Use of Size-Frequency in the Determination of Species of Pollen"; John F. Grayson, University of Michigan: "A Size-Frequency Study of Fossil *Pinus* Pollen from Lake Bottom Sediments of the George Reserve, South-