

The Teaching of Environmental Health

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SINCE the challenges of the environment have undergone sharp changes both quantitatively and qualitatively within the past few years, a review of the teaching of environmental health at this time is particularly appropriate. Environmental health deals with the impact of the physical, biological, and social environment on man and the adjustments and control of the external factors to promote his health and well-being. From 1900 until recently, environmental control by public health agencies focused mainly on communicable and infectious disease, and succeeded in the United States and Canada in completely controlling if not eradicating many communicable diseases, such as typhoid fever and malaria. These achievements were based largely on the development of safe water supplies and sewerage, milk and food sanitation, and the control of vectors, techniques that were learned well by students of environmental health in our schools.

Since World War II, the numbers, quantities, and uses of industrial chemicals have multiplied, and a virtually new hazard, radiation, has posed an implacable challenge. The volume and speed of traffic and commerce also have abruptly converted a landscape of sleepy, self-centered villages into a whirling megalopolis, invaded by habits, ideas, and parasites from all ends of the earth. The heightened level of consumption has also accentuated the physical hazards of glare, noise, obesity, congestion, heat, and violence.

Today, schools of public health have a duty to orient all persons toward these new problems

of the environment and in addition to assume part of the task of preparing highly qualified specialists in these new fields of investigation and protective or corrective action. For this reason the Association of Schools of Public Health in 1959 asked me to serve on an ad hoc committee to consider this subject. These comments cover highlights of the committee report, which was directed mainly at the master's degree curriculum.

Nonspecialists

With appropriate guidance, students of public health not specializing in environmental health may develop an appreciation and awareness of the hazards and stresses of the modern environment, so as to correlate the interaction between the physical, social, and biological environments. Currently only about 8 percent of the total hours applied toward a master's degree in a school of public health is credited to environmental health. In the opinion of the ad hoc committee of the schools of public health, this represents the absolute minimum, but it is not enough time for presenting the subject in depth. Even if the time in residence is extended, the percentage allocated to environmental health should remain at least the same. Also additional elective courses in environmental health should be available to interested students.

The allocation of priorities to a subject in the environmental health course will vary from school to school. The committee recommended that the content of the course be adjusted to the understanding that those not specializing in environmental health must acquire to obtain a balanced concept of public health implications

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of the community, occupational, and home environments. Recommended topics include:

- Water resources development, including supply and waste disposal.
- Community hygiene, including metropolitan planning.
- Interior and external atmospheres.
- Physical shelter, accident hazards, light, heat, and noise.
- Radiation as a community and an industrial problem.
- Food sanitation.
- Solid wastes disposal and vector control.

Specialists

It is important that individuals who are specializing in environmental health develop an understanding of the laws of human response to environmental stress so that they may, in turn, translate these laws into engineering terms for continued use in analysis and design of environmental structures. In this task, a mutually beneficial collaboration with biological, medical, and social scientists is indicated. For this reason, a "core" curriculum for environmental health specialists must include courses designed to develop understanding of man, environmental relationships, and responses.

The National Research Council of the National Academy of Sciences in its 1957 conference report on the "Education, Training, and Utilization of Sanitary Engineers" recommended as a core in the curriculum for sanitary and public health engineers the three basic subjects: environmental hygiene, statistics, and epidemiology. These were to amount to approximately 25 percent of the master's degree curriculum.

The ad hoc committee recommends for students enrolled in the program for the master of public health degree, or its equivalent, who specialize in environmental health that the core also include material in public health administration. Public health administration should be given time and emphasis about equal to that of each of the areas listed above.

The committee strongly recommends that candidates for the M.P.H. degree, or its equivalent, in environmental health be educated in depth in a specific field.

It was agreed unanimously that a 9-month

Committee Members

Members of the Ad Hoc Committee on Training in Environmental Health include Walter Mangold and P. H. McGaughey, University of California; Alvin R. Jacobson, Columbia University; B. G. Ferris, Harvard University; Cornelius Krusé, Johns Hopkins University; John Gannon and Clarence Velz, University of Michigan; Herbert M. Bosch, University of Minnesota; Roger Labonté, University of Montreal; Daniel A. Okun, University of North Carolina; M. A. Shapiro, University of Pittsburgh; Nelson Biaggi, University of Puerto Rico; J. R. Brown, University of Toronto; John Trygg, Tulane University of Louisiana; and Eric W. Mood, Yale University.

curriculum for a master's degree is insufficient. Graduate education in public health for specialists in environmental health should extend at least one calendar year (approximately 48 weeks), and for many students it seems essential that graduate training should be extended to two or more academic years (an academic year is considered to be approximately 32 weeks of instruction) to compensate for deficiencies of prior education or experience, or both. As an example, the study of public protection from radiation requires varying amounts of additional time, according to the history of the individual student. The need for additional training in the modern aspects of air pollution control or water pollution control has accentuated the inadequacies of the 9-month period of academic instruction. While so much more is to be learned than in the past, there is not much that can be discarded from the basic subjects of epidemiology, biostatistics, administration, and environmental hygiene if the graduate is to be considered adequately equipped for responsible duty.

In the interest of conserving time for the student, it was recommended that schools of public health investigate the possibility of offering course work on a 12-month basis and of using facilities of other units in the universities, especially for young engineers who have been recruited for public health work. Such recruits usually need both strengthening of

their knowledge of engineering and broad instruction in public health.

Engineering Schools

With respect to graduate education and research in sanitary engineering and environmental health, engineering schools, at present, train more students than schools of public health. Schools of public health have a unique opportunity and an obligation to increase such education and research programs, both in breadth and depth.

Schools of public health, being oriented to the biological and medical sciences, can draw support for their environmental health programs from departments of bacteriology and biochemistry, chemistry, and physiology. Thus their programs can be enriched in depth in dealing with the study of the nature of the environment and its effect on man. They can be expected also to draw strength from the natural science departments of the university.

Prerequisites

Engineers who plan to pursue graduate studies should have a baccalaureate degree in engineering, with adequate course work in chemistry, biology, and physics.

Sanitary scientists should have a baccalaureate degree in science, with a major in one of the natural sciences, together with adequate course work in chemistry, biology, physics, and mathematics.

If engineers or sanitary scientists are lacking such prerequisites, they should expect to make up the deficit either as a part of their regular program or before entering into the regular program.

The committee agreed that it is desirable to recruit engineers and scientists into graduate work directly from undergraduate training. Apparently, also, the Public Health Service traineeship program for professional personnel encourages entrance of students with little or no prior public health experience. At some schools, the only master's degree program open is the M.P.H., which generally has a requirement of 3 years of public health experience. A number of schools allow entrance to the master of science program without prior public health

experience. This committee did not recommend necessarily a change in the entrance requirements for the M.P.H. degree. However, it did recommend that there be a mechanism for allowing students to enter a master's program directly from undergraduate work.

Advanced Training

Training beyond the master's level for environmental health personnel is badly needed now and will be needed even more in the future for both teaching and research positions. The challenges of air pollution, radiation, water pollution, and occupational hazards have aggravated a severe shortage of engineering, scientific, and medical manpower. Facilities for training to the doctoral level and at the post-doctoral level must increase. The traineeship program operated by the Public Health Service under the Health Amendments Act of 1956 is a step in the direction of encouraging promising students to embark on environmental health and other public health careers. The number of master's degrees awarded in sanitary engineering (by engineering schools) has increased from 124 per year in 1956 to 197 in 1959.

Sanitary engineers and other environmental health personnel function primarily in the "public domain." More than half are employed by government, by nonprofit agencies, and by educational institutions. Their financial reward is almost certain to be less than that of their colleagues in industry. But dedicated candidates may be attracted by an opportunity for more extensive education and by the opportunity for productive research.

Schools have great difficulty in finding support for graduate students dedicated to research in environmental health. In each instance, no fewer than 3 years of graduate study and research are necessary for this training. A few students have been aided by sanitary engineering research scholarships. Others, aided by university research assistantships which limit the allowable course load, have had to extend considerably their stay at the university to complete their work for the doctorate. Many who would qualify for doctoral programs are deterred by the financial hardships.

In environmental health, as in other graduate

studies of the schools of public health, a balanced and continued program of support helps to attract and retain superior investigators and teachers. Good facilities and an active research program can only benefit from an adequate assurance of tenure. At present, graduate faculty members are frequently supported in large part by research grants which are allotted only year by year. With such financing, universities find it difficult to give investigators firm assurance of tenure, so as to encourage continuity of the staff.

The following steps would improve the

quantity and quality of environmental health: (a) an expanded program of financial assistance to those seeking graduate study to improve their qualifications for careers in environmental health; (b) a substantial program of financial assistance for predoctoral and postdoctoral study for those qualified for research and teaching careers in environmental health; (c) a program of coordinated assistance to schools of public health in support of the strengthening and expansion of staff and facilities for teaching and research centers in environmental health.

Planning Help for Mentally Retarded Children

An integrated statewide program for mentally retarded children was recommended in March 1960 by the Committee on Medical Care of the Maryland State Planning Commission. In a report to the Governor, the Subcommittee on Medical Services and Facilities for Handicapped Children urged that services and facilities of groups and agencies responsible for the health and welfare of mentally retarded children be coordinated into a flexible program to aid these children and their families. Specific proposals were:

- Construction of a second institution of 1,000 beds for mentally retarded children in the Washington metropolitan area, reasonably close to the research facilities of the Federal Government. (Custodial services and treatment are now centralized at the Rosewood State Training School in Owings Mills, Md.)
- Appointment of a committee by the Governor to assist in planning the new institution.
- Trial location of three additional small combination day care centers and residential half-way houses in medium-sized or small cities. In

addition to day care for local retarded children, these half-way houses would provide residential care for patients who might benefit from being near their families or who are being transferred from a large residential school to their community. If these pilot projects are successful, an increase in number would be recommended in order to eliminate the need for additional large-sized institutions which are presently projected for a decade hence.

- The Maryland State Department of Education and appropriate county departments of education assume responsibility for operating the schools at the State training institutions for the retarded.
- A study to determine the kind of vocational rehabilitation services that should be provided and the extent to which present services should be augmented.
- Appointment of a deputy commissioner or director to coordinate the State's institutions for mentally retarded children with local health and education services and with various community agencies and groups.