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### Environmental Education

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*This paper was presented at a colloquium entitled "Industrial Ecology," organized by C. Kumar N. Patel, held May 20 and 21, 1991, at the National Academy of Sciences, Washington, DC.*

## Environmental education

(profession/ecology/industry)

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**ABSTRACT** The need for a new profession devoted to environmental matters is asserted. The qualities of such a profession are sketched, and it is argued that new initiatives in environmental education are needed in the form of graduate, professional programs with primary emphasis on practice. An example 2-year program is presented. A fundamental requirement is scientific competence; undergraduate preparation in the sciences or engineering is mandatory. The graduate curriculum itself is built on three primary cores: environmental science and engineering, business and management, and public policy. Additionally, an environmental round table is proposed as a focal point for academic, industrial, governmental, and public discussion on environmental matters. The round table would provide oversight for the professional educational program and an affiliated research institute.

Over the past three decades there has been a remarkable transformation in public attitude toward the environment. Accompanying this revolution, and in part inspiring it, has been a widespread incorporation of environmental themes into education at all levels. Elementary school curricula are being infused with concepts of pollution, recycling, and renewable energy. Secondary school teachers are adding renewed emphasis on earth science and ecology and on environmental citizenship. At the university level, environmental studies programs have become common parts of liberal and scientific curricula, and we are seeing renewed emphasis on environmental issues within the basic sciences—physics, biology, chemistry, engineering sciences, and earth sciences. These emphases are inspiring advanced graduate research within the disciplines on environmental topics. Finally, professional schools have begun to incorporate environmental courses and specializations—environmental law, engineering, management, policy, and medicine. Across the entire landscape there is a ground swell of interest in environmental matters among the most talented of our young people, which was almost completely absent a generation ago.

These activities are now maturing in their own right and are making a remarkable contribution to both the breadth and depth of environmental insight. But particularly at the university level, the activity is necessarily diffuse, with special courses or units added at the margin to already overstuffed curricula and with environmental research added as another specialty to already over-articulated disciplines.

The entire academic enterprise needs, therefore, a focal point. This focus needs to be sufficiently clear and authoritative to express the environmental challenge as perhaps the greatest single challenge of our time and to fully engage the hearts and minds of our students. The central issue is ecology

in its most general form—how to sustain a rapidly growing and (necessarily) industrializing global population without provoking a Malthusian climax. While this is an old issue, there are new facts. In large portions of the world today we are witnessing a Malthusian outcome. Historically, we have relied upon technology to keep pace with population pressure. But it is now apparent that worldwide propagation of established industrial technology is likely to have catastrophic results in terms of global environmental quality and natural resources. An appropriate "metaphysics" relative to industrial technology is urgently needed—the knowledge and vision needed to inspire, control, and accompany continued industrial development in an environmentally sound and sustainable manner.

Accompanying the need for the advancement of environmental knowledge, there is a concomitant need for authoritative environmental leadership in the form of dedicated practitioners across the organizational landscape, with continuing exposure to environmental research and a shared commitment to objective environmental analysis.

### A New Profession

The environmental challenge is permanent—it will never go away. Because of this permanence, it is appropriate to anticipate the development of a new profession, focused fundamentally on the environment and standing alongside the established professions. This new profession would be devoted to synthesizing the diverse branches of environmental knowledge and research into a workable whole; to defining a suitable ethic relative to the environment; to developing the competent practice of environmental management in government and industry; and to maintaining a vigorous, independent research program focused on emerging problems.

We argue that a pressing educational priority lies in the development of this new profession. Because the intellectual challenge is broad and fundamental, it cannot and should not be attempted entirely at the undergraduate level. To do so would sacrifice other essential educational objectives, including those related to mastering one of the traditional intellectual disciplines. Further, the education we propose demands a practice-oriented approach, inappropriate in the general undergraduate context. An emphasis on postgraduate, professional education makes explicit the pressing critical need for practitioners with advanced preparation, drawn from the leadership ranks of college graduates. Finally, professional education would serve the balance of the educational spectrum, generating case studies and other instructional materials for undergraduate courses as well as identifying key research issues for affiliated Ph.D. programs.

The need for such a profession is illustrated by the polarity which characterizes much of the present environmental dialog. We may identify several related poles:

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conservation	development
environmentalist	technologist
regulator	pollutor
public goods	free market.

On the left we generally find the recognition that less consumption and sustainable technology is necessary, while on the right we find the legitimate aspirations of the developing world. The vacuum between these views and the vigor with which they are expressed illustrate the centrality of the environmental problem. There is a desperate need for an objective common ground among these poles, consisting of a workable set of theories, practices, and norms. In fact, real environmental progress demands such an intellectual and practical synthesis.

Into this vacuum it is easy to project a professional group with members active on both sides—in government, industry, and private practice—but with independence from these institutions, self-governance, and authority conveyed through some form of competence-based qualifying procedure. Such professionals would, over time, redirect the environmental debate toward cooperative management rather than adversarial regulation.

Abstract definitions of “profession” abound and are controversial. For example, Millerson (1) distilled from the literature a list of 23 elements that have been used in defining the professions. As reviewed by Johnson (2), among the most frequently used are

- skill based on theoretical knowledge,
- the provision of training and education,
- testing the competence of members,
- organization,
- adherence to a professional code of conduct, and
- altruistic service.

An environmental profession with these traits would fill the vacuum among the poles, and is desperately needed.

The process of professionalization is complex and difficult to abstract or generalize. Wilensky (3) observes the following natural progression in the United States: (i) the emergence of a full-time occupation, (ii) the establishment of a training school, (iii) the founding of a professional association, (iv) political agitation directed toward the protection of the association by law, and (v) the adoption of a formal code. The first step has already begun. Large numbers of full-time positions in science, law, business, medicine, engineering, and public policy are already devoted to environmental matters. The various professional schools serving this diffuse group have been busy adding focus on the environment, as mentioned above. These people are the seed of the emerging environmental profession.

We arrive, then, at the second step—the establishment of professional education focused on the environment.

### Distinctively Competent Graduates

“Skill based on theoretical knowledge” is absolutely necessary as a starting point. If any independence and authority is to be achieved, it must derive from obvious competence within defined limits of knowledge. A first principle of any professional school must therefore be that its graduates have distinctive competence, which was developed as a student. The preceding discussion suggests an overall educational theme as follows:

the development and propagation of a comprehensive “ecology” that emanates from a core of professed principles; that includes humans, corporations, and the biosphere; that recognizes industrial activity as necessary;

and that recognizes the potential and limitations of technology.

Supporting this goal, we define the following distinctive traits:

- competent environmental analysts using scientific and quantitative tools;
- creativity—i.e., capable of marshalling the creative force of technology toward the design of sustainable industrial activities;
- an understanding of the roles of science, technology, regulation, and economics in structuring industrial as well as individual behavior relative to the environment; and
- ability to “get things done” within the complex of corporate and government activity.

Finally, knowledge and skill alone are insufficient in the absence of a clear and open statement of adherence to a professional ethic. Such an ethic will have to derive from the requirement for balanced, objective analysis within defined limits of knowledge and competence.

### A Model Professional School

**Academic Program.** An appropriate educational model is the 2-year professional school. Undergraduate preparation in the sciences or engineering is required, with preference for some years of related experience. An in-residence program of study would be structured around three primary academic cores (Fig. 1).

(i) *Environmental sciences and engineering.* The sense of competence is science-based in this model. It is assumed that students have mastered one of the conventional scientific disciplines; the graduate curriculum must necessarily broaden the science base beyond conventional disciplinary bounds. Key interdisciplinary offerings in earth sciences and ecology are essential, as is an emphasis on the potential of technology. Some specialized coursework is desirable, as in conventional MS programs; but the conventional independent thesis requirement is replaced by the “capstone activity” (below) which is group-based.

(ii) *Management science.* Professional practice demands that graduates function effectively within large organizations,

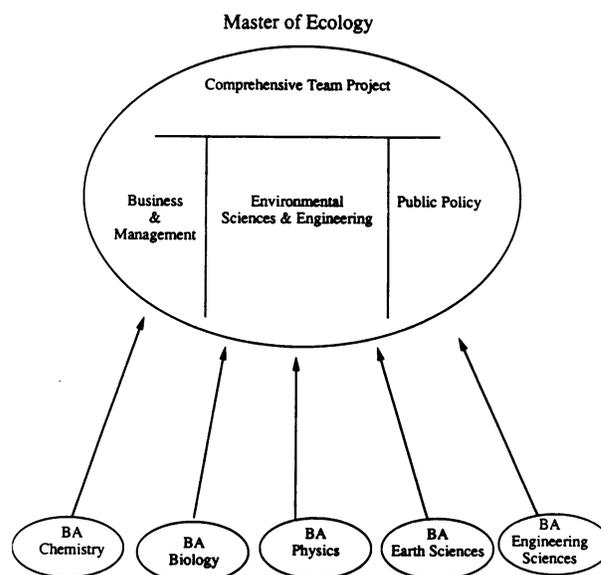


FIG. 1. Academic structure of a 2-year professional degree program. Scientific undergraduate preparation is required; core study in three major areas is supplemented by a comprehensive team project in year 2.

or at least address their efforts toward the actions of industrial and government clients. Accordingly, key aspects of management are necessary, including accounting and finance, organizational behavior, production management, quality assurance, and human relations. A thorough understanding of economic theory is necessary, sufficient to support sound decisions in both public and private sectors and an understanding of private-sector response to public-sector initiatives.

(iii) *Public policy.* Reflecting the essential nature of environmental quality, in-depth study of the economics of externalities, public goods, and natural resources is necessary. Further, a thorough grounding in the instruments of public policy is required, including regulation, legislation, taxation/subsidy, and publicly owned means of production. A full working knowledge of contemporary environmental law and its historical underpinnings is essential.

An additional program element is professional ethics. This is a critical priority, being a basic requirement for the legitimization of a new profession. The development of an appropriate professional ethic would have to be given special attention in the formative years.

Upon these three cores would stand a capstone activity, focused on a real industrial problem. This capstone activity would be structured around and would emphasize a teamwork approach; problem-solving; the whole problem, including scientific, legal, regulatory, and corporate aspects; a practical implementation of specific solutions in the given institutional context; and communication of results to diverse audiences. Such a capstone experience calls for intensive corporate involvement, in the form of visiting faculty and on-site assignments of project teams, as well as providing the specific problems to be addressed.

Students would require two academic years to complete such a curriculum. The intervening summer would be devoted to an internship in government, industry, or public service, which would be organized and supervised as a curricular element. The internship program would be a key outreach activity, propagating the knowledge base and bringing back to the program the materials, contacts, and substance for case studies and capstone projects.

We entitle this degree "Master of Ecology." This title emphasizes the interaction of humans and their organizations within the environment. It goes beyond the study of the environmental media alone and extends the ecological perspective to include corporate and government agents and industrial activity. (For the moment, we ignore the inevitable conflict of nomenclature with the established ecological discipline. One is tempted to add qualifiers such as industrial or human ecology; but these suggest a narrowing of ecological focus rather than the expansion we propose.)

**Research Institute.** In addition to establishing a flow of distinctive graduates, a model professional school must be proactive in defining critical research priorities based on emerging problems, technologies, and public policy issues. An affiliated research institute would focus and amplify faculty and student activity through professional staff and ongoing Ph.D. research, organized through conventional university departments. This extension to advanced research students and faculty is an indispensable element; like the internship program, it is an outreach activity that works both ways: it informs the research agenda about critical environmental priorities, and it infuses the professional curriculum with new knowledge.

**Environmental Round Table.** We propose an environmental round table as depicted in Fig. 2, where academic, corporate, and government executives would work together in guiding the development of this new profession. In particular, the round table would provide guidance in the development of curriculum, notably in the contribution of case

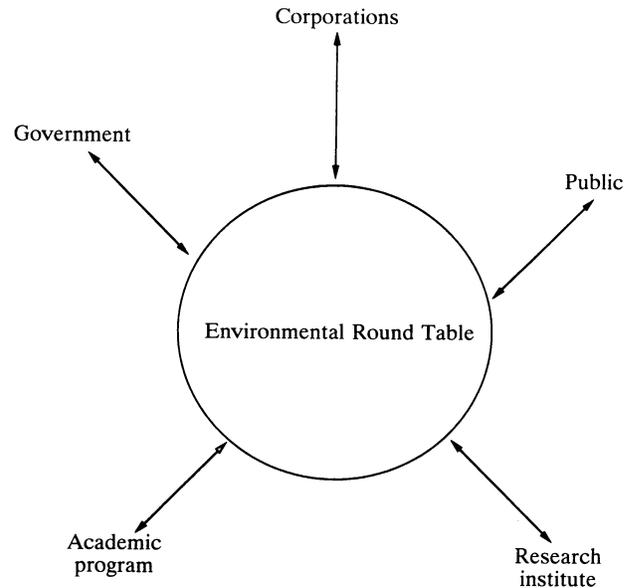


FIG. 2. The Environmental Round Table: a structured discussion of environmental matters among all constituencies, focused on guiding educational and research activities as well as informing public dialog.

materials, capstone projects, and visiting faculty. The round table would also oversee the research institute and help to shape its programmatic themes. It would organize key outreach activities, including the convening of open dialog among the public, scientists, corporations, and government on critical environmental issues. Finally, the round table would be active in identifying appropriate professional roles and career paths for graduates and in encouraging the development and legitimization of a new professional society, actively engaged in practice in both government and industry, but independent from both.

#### An Agenda for Leadership

The establishment of this new professional education requires energy, vision, and coordinated leadership on several fronts.

**Deans, Provosts, and Presidents.** University administrators must articulate the primacy of the environmental challenge and the depth of the intellectual commitment required, legitimize scholarship and teaching in this arena, support faculty in the risky business of defining new academic ground, and coordinate all academic constituencies toward institution building.

**Faculty.** Individual faculty will have to take the intellectual risks associated with new fields of scholarship and reaffirm the importance of professional graduate education relative to narrow, discipline-oriented research. In particular, new curricula have to be developed that can be taught to a diverse, interdisciplinary graduate population. Conventional scientific subdisciplines will have to be merged in course work, without the support of extensive prerequisites. On the management and policy side, new curricula are needed that take advantage of the quantitative skills acquired through undergraduate preparation in the sciences.

**Corporations.** Industrial leadership is crucial at many levels. Participation in the environmental round table is essential. An active internship program requires high-level corporate emphasis, as does the academic participation of executives and environmental managers as visiting faculty-in-residence. Finally, and most importantly, corporations will ultimately employ many of the graduates of such a

program. An early emphasis on placement of graduates into positions of responsibility represents a leadership challenge, as does the encouragement of an independent professional society among professional employees.

**Students.** The ultimate leadership challenge rests with students. Students must demand the interdisciplinary curricula and program outlined above and be prepared to vote with their feet. (All successful institutions know the power of this!) Further, students must demand that course work and programs go beyond the superficial to the substantive and that university dialog go beyond elitism to populism relative to global environmental issues.

#### Closure

Finally, all parties involved must demand of themselves high standards of performance relative to the environment as a necessary ingredient in sound industrial/governmental management. A distinguished former president of Dartmouth

College, John Sloan Dickey, articulated the goals of undergraduate education in terms of the "four Cs": Conscience, Competence, Comprehensive awareness, and Commitment (4–6). Originally addressed to the postwar challenges facing higher education, the four Cs are equally relevant to the challenges we now face in addressing environmental education. A professional program whose graduates were so characterized would be a welcome addition to higher education.

1. Millerson, G. (1964) *New Society* 4 June 1964, p. 15.
2. Johnson, T. J. (1972) *Professions and Power* (Macmillan, London).
3. Wilensky, H. (1964) *Am. J. Sociol.* **69**, 142–146; as cited in Johnson, op. cit.
4. Dickey, J. S. (1955) *The Atlantic Monthly*, 31–35.
5. Dickey, J. S. (ca 1964) *Dartmouth on Purpose* (Dartmouth College Library, Hanover, NH).
6. Lathem, E. C., ed. (1977) *John Sloan Dickey: The Dartmouth Experience* (Univ. Press N. Engl., Hanover, NH).