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## Goals of Science Education

Much of the discussion of the crisis in science, mathematics, and engineering education has been in terms of the exposure of individuals to these subjects in the precollege and early college years. Much less attention has been given to the nature and quality of that educational experience—properties which can best be assessed in terms of goals.

All education is the consequence of the response of individuals to enabling experiences—experiences provided to the individual and experiences generated by the individual. What are the goals we seek to enable the student to accomplish? The traditional goals for many science programs have been to enable the individual to get on with the process of becoming a scientist, or to decide against a scientific profession. What are the goals for those who do not become scientists, and what do we seek to enable these students to accomplish?

I suggest that we seek to provide experiences to enable the student to accomplish the following goals:

- To discover and explore scientific phenomena.
- To have some experience with the scientific approach to the rationalization of the results of investigations.
- To develop some understanding of the integrity of the process of scientific investigation and through that the integrity of scientific knowledge.
- To develop some understanding of the process of technological innovation and of the productivity of technology.
- To explore the impact of scientific knowledge on the manner in which we perceive ourselves and on our relations with others and everything that surrounds us.
- To explore the impact of technology and the products of technology on the quality of life and the quality of the environment.
- To develop the interest, competence, confidence, and will to continue to follow, throughout the next half century, scientific and technological developments in areas related to societal concerns.
- To develop the will and confidence to endeavor to participate critically in the formation of decisions in societal matters involving science and technology.
- To develop to some degree an understanding of probability and statistics and the place of both in science and in the analysis and resolution of societal problems.
- To develop familiarity with the role of computers in the extension of scientific knowledge and technological capabilities.
- To develop the confidence to acquire competence in specific areas of technology closely coupled to the fulfillment of his or her professional responsibilities.

All of these goals are equally appropriate for those who become scientists. There is, however, a difference. These are primary goals for civic and professional life and they must be pursued during a period of limited exposure. Those who become scientists have a much longer time span within the formal academic environment to achieve these goals at a higher level of attainment.

With the exception of scientists in academic institutions, it is highly probable that whatever an adult over forty knows and understands about science and technology was acquired outside the formal academic environment. What the individual knows and understands is, however, dependent upon the academic experience.

The great significance of having these or some other set of goals is that we can get on with the endeavor to develop appropriate mechanisms: courses, media events, and so on. These goals emphasize the significance of process and minimize the pressure to overload the academic experience with facts, and in so doing give us a refreshing degree of freedom in the selection of topics and methodologies of approach.—ANNA J. HARRISON, *Department of Chemistry, Mount Holyoke College, South Hadley, Massachusetts 01075*