

SCIENTIFIC EQUIPMENT FOR UNDERGRADUATES:
IS IT ADEQUATE?

INTRODUCTION

At the request of Chairman Orrin G. Hatch and Senator Christopher J. Dodd of the Senate Committee on Labor and Human Resources, the Office of Technology Assessment (OTA) conducted a review of the adequacy of instructional equipment used to teach science and engineering to undergraduate students at American colleges and universities. An interview was conducted with individuals familiar with the issue, including representatives of scientific and professional societies and associations of academic institutions, and faculty members and administrators from a variety of educational institutions. To determine whether equipment problems were affecting the quality of preparation for future careers of science and engineering bachelor's degree recipients, interviews were conducted with deans of graduate schools and industry representatives. Finally, officials responsible for Federal Government programs in undergraduate science education were interviewed for their perspectives on the policy issues.

In the course of the interviews, OTA concentrated on the following questions:

- To what degree is undergraduate instructional equipment obsolete or deficient? How do these deficiencies affect the quality of instruction in science and engineering in the Nation's colleges and universities?
- What are the causes of equipment deficiencies?
- Which fields of study have the most serious problems with obsolete equipment?
- Which types of equipment are most deficient?
- Which types of institutions are most in need of improved equipment?

- What are the effects of equipment deficiencies on the preparedness of science and engineering B.S. degree recipients for future careers?
- What solutions are available to remedy the deficiencies in scientific equipment for undergraduates?

This background paper presents the results of those interviews. It is divided into five sections. Section I discusses the magnitude, impact, and causes of the problem as perceived by educators and scientists. It attempts to answer the first two questions listed above. Section II breaks down the equipment problem by major field and type, with chemistry and engineering given the greatest attention as the fields with the most serious problems. Section III discusses the equipment needs of different kinds of institutions, with an emphasis on small liberal arts colleges and junior colleges. Section IV describes the effects of equipment deficiencies on the preparedness of science and engineering B.S. recipients from the point of view of graduate school deans and industrial employers. Finally, section V reviews current Federal programs for undergraduate instructional equipment and lists some possible methods and options for increasing the supply.