## Issues for Planners

**The State of Graduate Education.** BRUCE L. R. SMITH, Ed. Brookings Institution, Washington, DC, 1985. x, 193 pp., illus. Paper, $9.95. Brookings Dialogues on Public Policy. From a conference, Washington, DC, Nov. 1984.

The sciences and engineering are the primary focus of attention in this review of American graduate education, but the range of topics and the depth in which they are discussed make the book relevant to academic planning as a whole. Although the data for some sections are as recent as 1984, tabulations in other sections are less current. Fortunately or not, the major directions of events have not been altered, a fact that only adds urgency to the points being made.

A succinct presentation on the minority presence in higher education discusses two strategies for reducing the underrepresentation of women and minorities: early intervention in the undergraduate years to introduce such students to research and a faculty-student mentoring program intended to ensure intensive, closely monitored involvement in research, both activities reinforcing the students' urge toward and capacity for graduate study.

An assessment of the status of graduate education in engineering challenges all concerned. The inability to attract and retain first-rank faculty, the inability to obtain, or maintain, equipment and facilities for state-of-the-art instruction and research, and the inability to attract the best of the U.S. undergraduates in engineering into full-time graduate study must ultimately lead to a massive deterioration of university engineering efforts and a consequent abdication of responsibility to industry. It is suggested that weakness in current engineering curricula, faculty overload, and inadequacy of research facilities have been hidden from current employers owing to the high quality of today's engineering undergraduates.

Compensatory efforts to maintain enrollments in engineering schools account for the large number of foreign undergraduates who are deficient in familiarity with necessary equipment and mastery of the English language. The movement of foreign students into graduate work and ultimately onto the engineering faculties will make for difficulties in the schools' relations with government contracting and granting agencies as pressure to restrict the transfer of information overseas becomes more apparent within the government.

Where the support structure for first-rank experimental research, in the form of assistants, paraprofessionals, and money for supplies and expenses is lacking, engineering schools will not even attempt to develop in-house facilities that are needed for experimental (as opposed to analytical) research, with the result that responsibility for this engineering activity will be transferred out of the university. Entirely new arrangements for acceptable graduate education in engineering may have to be made.

The computer revolution and its dimensions are being recognized generally throughout higher education. The very survival of educational institutions may depend upon the skill and aggressiveness with which they accommodate to the revolution, that is, on how the computer is employed in the service of teaching, research, and information management. The universities will have to decide the role their continuing education units shall play for them if changes in the location and methods of education mean that the institutions become less campus-oriented.

The chapter on the problem of capital facilities will be of interest to all who participate in decisions to recruit outstanding faculty members into science and engineering departments. The cost of such a recruitment ranges between $200,000 and $800,000 to cover new equipment and preparation of the space to house the new staff member.

In the consideration of broader philosophical issues and choices facing the academic planner for graduate education that concludes the volume it is suggested that some degree of contingency planning should be attempted to prepare for "likely contingencies not included in the mainstream of academic projections on which . . . policies are [typically] based." A set of "surprises" are enumerated that "seem to be in the realm of reasonable probability." Planning in advance for countermeasures and political strategies to be adopted should these contingencies arise would be a novel approach and potentially very wise.

This is a volume that should command a readership extending beyond academia into industry, government, and the philanthropic agencies of the nation.

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Number of doctoral degrees in science and engineering per 100 bachelors' degrees awarded six years earlier.

| Year of doctorate | All fields | Engineering | Mathematics and computer science | Social and psychological sciences | Life sciences | Psychological and social sciences |
|---|---|---|---|---|---|---|
| 1970 | 11.9 | 9.7 | 6.5 | 25.0 | 14.9 | 9.1 |
| 1975 | 7.8 | 7.2 | 4.1 | 16.7 | 10.3 | 5.8 |
| 1980 | 5.9 | 5.7 | 3.6 | 14.8 | 8.0 | 4.0 |
| 1983 | 6.5 | 6.7 | 4.8 | 15.2 | 7.1 | 4.8 |

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## Science Teaching Surveyed

**Science Education in Global Perspective.** Lessons from Five Countries. MARGRETE SIEBERT KLEIN and F. JAMES RUTHERFORD, Eds. Published for the American Association for the Advancement of Science by Westview, Boulder, CO, 1986. xxii, 231 pp., illus. Paper, $22. AAAS Selected Symposium 100. From a symposium, Washington, DC, Jan. 1982.

In the past several years, science educators in the United States and other countries have become increasingly interested in going beyond the confines of national borders to seek ideas, share information, and discuss common problems. Cross-national science education conferences are increasing in number and variety. More and more students, professors, consultants, and researchers in science education travel from their home countries to others. Papers published in science education research journals originate from many different countries and give increasing credence to a view of science education as an international enterprise. Thus the publication of *Science Education in Global Perspective* is timely.

The book provides a vivid conspectus of the context for science learning in five Asian and European countries, which are economic or ideological competitors of the United States on the world scene. Readers will not find accounts of science education in countries from all parts of the globe in this book, as they might expect by interpreting the word "global" in the title to mean worldwide. The book also does not deal with tertiary education in the sciences. What the five authors of the book's major chapters do provide are rich descriptions of the conditions of both elementary and secondary