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(Education and Training for) Information Retrieval

The value of educating students in the modern techniques of retrieval and communication of scientific information is no longer disputed. The problem is—how and when. While many educators talk about the need for undergraduate and graduate instruction, very little has been done. This educational need was discussed at a symposium on "The place of information retrieval and scientific communication in the education of the scientist," held at the 133rd AAAS Meeting, Washington, D.C., 27 December 1966. The speakers and panelists at this symposium were selected primarily because none represents the professional information retriever or technical writer. As such, they ought not be accused of grinding an ax with respect to the training of professional information scientists or training scientists to use and prepare information.

Undoubtedly the topic chosen by F. Peter Woodford (Rockefeller University), "Training in scientific thinking through the teaching of scientific writing," attracted the most attention because he dealt with two "truisms." Scientists ought to know how to write. And they ought to know how to think. Woodford convincingly demonstrated that good writing is usually accompanied by clear thinking. Since his report was based on three years of experience teaching a course to students and faculty, it had the ring of authority.

Eugene Garfield (president, Institute for Scientific Information) stated candidly that he had a selfish interest in the symposium topic. His experience in several years of teaching a graduate course in information retrieval at the University of Pennsylvania had clearly demonstrated shocking neglect in the undergraduate education of engineers in the use of libraries. It seemed almost ludicrous for computer scientists and engineers to be discussing automation in libraries when they did not have the slightest acquaintance with the most elementary bibliographic apparatus. Indeed, the lack of training and exposure to such systems may account for the large number of absurd "solutions" offered by hardware-oriented engineers who were not conscious that one might retrieve information in one minute by use of a printed index that would require hours on the most sophisticated computers available.

John Bardeen (University of Illinois) tended to agree with this view, but particularly stressed the absurd waste of valuable technological information available in U.S. patents. His talk, "How can patent literature be made more useful," also provided him an opportunity to report on the recently released report of the President's Commission on the Patent System on which he served. Bardeen implied that academic neglect of the patent literature, in contrast to journals and books, is an unjustifiable form of snobbism. One panelist pointed out that this might also have something to do with an historical aversion in academe towards profit-making, which patents seemed to symbolize. Bardeen agreed that education of scientists should include instruction in information retrieval, though he did not feel too strongly about its potential value for physicists. Physicists tended to ignore the literature much more than their biological confreres who were not only more literature minded, but had a larger literature on which to draw.

If Woodford's theme concerning writing was considered a truism, Bardeen and other panelists pointed out that the value of information retrieval systems is not. There remain many scientists and engineers who would like better and less literature to be published, but they rarely, if ever, make use of systems for information retrieval or selective dissemination. This view was epitomized by a short presentation writ-

ten by John T. Edsall (editor, *Journal of Biological Chemistry*). He found that he relied less and less on abstracting and indexing services and hardly had enough time to read and digest the hundreds of journal manuscripts that passed before him each year. His paper was read in his absence by Morton V. Malin (Institute for Scientific Information, Bethesda). Malin stated that Edsall surely was atypical. The average graduate student or post-doctoral fellow, even if close to one of the invisible colleges, does not have the opportunity of being on top of the literature as does the editor of a journal like the *Journal of Biological Chemistry*. Furthermore, there was considerable evidence that the multidisciplinary nature of research today makes it all the more imperative that even leaders of invisible colleges or information exchange groups have good knowledge of and access to the literature in ancillary fields or on topics which might seem at first glance to be "peripheral."

Leonard Ornstein (Mt. Sinai Hospital Medical School) not only seconded this view but added comments based on his experience as a referee and member of the Editorial Board of *Journal of Cell Biology*. He felt there was a shocking and disturbing trend to ignore the published literature. Each self-proclaimed expert was "sure" he knew the entire literature of his field without the most routine searches. Ornstein also debated some of the basic issues taken up by Frederick L. Goodman (University of Michigan), the only speaker representing the field of education. Goodman's theme, "The pedagogical politics of educating scientists," contained some sober reflections drawn from his expert knowledge of Dewey's pragmatic philosophy. He was quick to point out that he meant John Dewey and not Melville Dewey of the decimal classification system. Goodman indicated that modern concepts of information retrieval were part of the coming revolution in teaching and the mere introduction of one course in retrieval was barely approaching the solution to the problem. The computer revolution, as is well known, is already having dramatic effects on education. This was quickly confirmed by Dean Sanborn C. Brown (Massachusetts Institute of Technology) who took the position that it was possibly wiser to introduce undergraduate students to time-shared computers to learn information retrieval before they had been exposed to traditional systems. Any bright student would eventually find his way to the university library. Daniel Gore (Asheville-Biltmore College, North Carolina) took issue with this approach to library instruction, stating that it was the primary task of the librarian to instruct students in the use of library *materials* and retrieval systems. Incidentally, Gore recently created a furor in the library profession by publishing an article in the *Bulletin of the AAUP* which attacked the bureaucrats of the library profession and the proliferation of local cataloging at the eventual sacrifice of book purchases. His paper, "Sweetness and light: A goal for libraries," demonstrated the beauty that can result from the blending of a humanities-trained scholar with a science-oriented theme.

Andrew Lasslo (University of Tennessee) opened the session with "Scientists and literature resources," a presentation of the feelings of a pharmaceutical chemist who had taken the time and energy to do something about training a core of badly needed science librarians.

James D. B. O'Toole (Boston University) provided a fitting parallel in discussing his graduate program for the training of science communicators. His program is designed to increase public understanding of science by equipping science graduates to help unclog the communication channels between science and society.

In opening the session, the chairman read statements by several panelists who could not attend, including Halvor Christensen (University of Michigan),

William Fowler (California Institute of Technology), and Alvin Weinberg (Oak Ridge National Laboratory). Weinberg's remarks would appear to be a fitting conclusion to this report:

"Science's commitment to the handling of scientific information is increasing daily. As science grows, so this commitment must grow.

"What is the nature of this commitment? Obviously, more money will have to be spent for information-handling systems—for computers, new journals, and new retrieval mechanisms. More secondary information handlers will be required: the information center, which was viewed as crucial in the PSAC report 'Science, Government and Information,' is proving to be a dominant element in the new information system. The information center will surely continue to proliferate and develop as science and scientific information increase.

"But the most important commitment of science to information must be the commitment of the individual scientist. Generally, scientists view the handling of scientific information as separate from science itself. They are individually unwilling to devote much of their time to the task of managing the flood of scientific information. This attitude is untenable. Every scientist must accept his share of the responsibility for controlling scientific information. He must realize, as a matter of course, that when he adds to the cascade of scientific information, he assumes a responsibility to participate in the management of the flood.

"I believe the university has a clear duty in this connection. Our coming generations of scientists must be taught to accept their responsibility toward information—not grudgingly and with half heart, but fully and constructively. This attitude represents a change from the prevailing attitude. Scientists generally fail to see why they should be bothered with helping to manage scientific information; this they learn from their professors and colleagues who are similarly disinclined to make the necessary sacrifices.

"But sacrifices will have to be made if science itself is not to collapse. The education of every scientist will have to include instruction in handling the new and ingenious tools of information retrieval. The educational process will even more have to inculcate into all scientists a willingness to contribute time and effort in behalf of the entire scientific communication system."

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