As indicated, in our case, we found that a subfile of data from 4000 experiments was more than enough justification for automation.

Preferably, a computer should be available already within the research department on site. Ideally, time on the computer and programming should be either on a no-charge basis or carry minimal rates. In addition, there must be available an experienced programmer to act as an advisor or consultant to the technical people who write their own programs. Also essential are a keypuncher and a computer operator within the research department.

Most essential is the backing of research management to provide the funds and encouragement to use the computer, and the willingness of R & D personnel from all phases of the project to get fully involved.

PLANS

The development of the system may require modification of the original input format to accomodate entry of quantitative analytical data or other data from pre-pilot plant or pilot plant operations. More satisfactory input of data may be obtained in the future by use of mark-sensed cards. Also, it may be desirable to consider those features of the IBM 1800 which make possible on-line input if desired. For rapid access to original notebook data, it may be desirable to microfilm these notebooks in a form suitable for automated cartridge readers.

Introduction to Symposium on Training Chemists in the Use of Chemical Literature*

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Received December 27, 1968

Chemical literature courses can be deadly dull for both the student and the teacher. They are likely to be deadly dull if they consist of a seemingly endless recitation of book and journal titles, with indication of editorial scope, name changes, organization of material, frequency of issue, indexes, etc. Reasons why some courses are still being taught in this way are discussed at this symposium. Suffice it to say at this point that there are better ways. The objective of the symposium is to point out that there are new information systems and information services of interest to the chemist and that there are new ways of acquainting students with these tools.

It seems to me that one of the functions of a course in chemical literature is to instill good information gathering and use habits in our students. There is probably little disagreement with this opinion. The trouble with it is that it begs the question unless we define what we mean by good information gathering and use habits. And this is very difficult to do. We have reasons to believe that our own information habits, the ones we have been taught or have taught ourselves over the years, may no longer be equal to the task. New techniques that are being proposed and tried out appear promising. We have not as yet used these new and largely machine-based methods long enough to be more sanguine about them. They have to be tested and then further refined, just as new methods that are introduced in the laboratory. One such test of machine-searchable indexes prepared by Chemical Abstracts Service is now being conducted in this country and in Great Britain. In Great Britain, chemistry students in their final year of the Ph.D. program are provided with an individualized current awareness service. Keywords that characterize the student's subject interests are matched by a computer against keywords that characterize the contents of newly received documents. Either *Chemical Titles* or *Chemical Biological Activities* is searched, and potentially relevant documents are directed to the student's attention.[1] This current awareness service accomplishes two useful things. It introduces the student to a new information service and it provides a test bed for the service. I hope these tests will be successful, and that as a consequence machine-searchable current awareness services can be offered to a larger number of students.

What conclusions can we draw from the Symposium papers? Herner's approach in his one-day course for working scientists and engineers appears equally valid for chemistry students. The topic is presented by Herner on a problem-solving rather than on a "duty" basis. Techniques for the organization of information, for example, are not presented as something that the student needs to memorize as an academic exercise, but as techniques intended to help him in locating documents needed in his work and in organizing his own document collection. The Martin and Robison survey tells us that a sizeable percentage of the reporting schools have dropped their formal chemical literature courses between 1960 and 1967. The apparent lack of enthusiasm on the part of both faculty and students for such courses is not likely to reverse this downward trend during the next few years. Hopefully, these courses will be replaced by more effective techniques for teaching students what they need to know as users (and eventually producers) of chemical literature. Three techniques which are new for teaching this skill are discussed at the Symposium. They are a "packaged" audio-visual course, machine-searched indexes as teaching aids, and video-taped lectures by experts in the field. The judicious use of these and other new techniques as exemplified by computer-aided instruction may well provide the short term solution for this problem. For the long term solution, more needs to be known about what should be taught.

*Presented before the Symposium on Training Chemists in the Use of the Chemical Literature, Division of Chemical Literature, 156th Meeting, ACS, Atlantic City, N. J., Sept. 8–13, 1968.

LITERATURE CITED

(1) Somerfield, G. A., "Students' Chemical Information Project," *Chem. Britain* 4 (2), 71–3 (February 1968).