An Audio-Visual Guide to the Chemical Literature*

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Although most institutions attempt some sort of training of their students in the use of the chemical literature, the informal approaches used have been ineffective. In an attempt to meet the need for a more individualized instructional system, an audio-visual approach is suggested. An "Audio-Visual Guide to the Use of the Chemical Literature" could serve as an instructional service in institutions and libraries in which no formal instruction in chemical literature is available. The A/V Guide presently consists of 28 units, each of about 10 minutes' running time, that provide an audio taped commentary synchronized with a visual display (2- x 2-inch color slides) of the chemical publications discussed. The use of slide carousels and stereo, reel-to-reel tape cassettes in a rear-screen projection console unit allows individual student handling and control. The slides are advanced automatically by an electronic signal on the tape. The A/V Guide serves as the main instructional device in the chemical literature course at E. Michigan University. Students are given library assignments, the contents of which are correlated with information provided in appropriate units in the A/V Guide. A test is also being developed that might be used in determining a student's proficiency in use of the chemical literature.

An audio-visual approach to the training of students in the use of the chemical literature has been adopted at Eastern Michigan University, in an attempt to overcome a number of difficulties encountered in the teaching of a chemical literature course by a traditional method. Until recently, this instruction was one component of a course entitled "History and Literature of Chemistry." The dual, and sometimes incompatible, purposes of the course were themselves factors making it difficult to provide a satisfactory level of instruction in chemical literature. Initially, the approach used in the teaching of the chemical literature part of the course was traditional; that is, it involved lecture presentations, the contents of which were usually based on information contained in the text required for the course, and the assignment of library problems, which were designed to provide students with actual experience in the location of information in the library. It soon seemed desirable to supplement the lectures with some illustrations of the publications discussed, since it is easier to talk about the content and organization of a chemical publication if the students can see what is being talked about. This procedure was unsatisfactory for the following reasons.

1. A considerable amount of time and effort is required to locate and transport samples of the publications from the library to the lecture room. In addition, one is restricted to illustrations of those publications that are available or readily accessible in the library.
2. This means of illustrating the contents of the publications does not adequately meet the needs of the students. Since the students could not really see the publications as displayed on the lecture table, one usually resorted to either the circulation of the publications during the lecture or requested the students to examine the publications at the end of the period. In either case, the procedure was cumbersome and did not allow the student time to examine the material in any detail when it was being discussed.

An obvious solution to this problem would be to illustrate the publications by means of slides or transparencies, so that they could be seen by all of the students while the lecture is being given. The use of slides not only allows the contents of the publications to be viewed in considerable detail during the discussion, but also enables the instructor to discuss publications that are not available in his own library, but about which he feels the student should be aware.

While the use of visual aids could certainly increase the effectiveness of a lecture in chemical literature, this innovation alone would not improve appreciably the overall quality of the training of chemists in the use of the chemical literature. The major reason for making this assertion derives from the fact that only about 40% of the colleges and universities that have a chemistry program offer any formal instruction in chemical literature.[1,2] At the remaining institutions, chemical literature is taught by a variety of informal methods and is integrated into other courses. The reasons for these institutions not offering a formal course in chemical literature are summarized in the most recent survey taken by Martin and Robison.[2] Even in the schools that do offer a course, there are still large numbers of students, such as chemistry minors or occasional users of the chemistry library, who could profit from the training, but do not receive it because of prerequisite requirements or scheduling problems. The fact that large numbers of students are not receiving

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any instruction in chemical literature by means of the formal courses suggests that other methods must be considered in any future planning designed to provide chemists with training in the use of the chemical literature. Before suggesting some alternative methods, it is necessary to consider what features an instructional system in chemical literature should contain if it is to serve the students' needs more adequately.

1. The instructional system should be available to the student when he needs it.

It is certainly apparent that many students do not enroll in formal courses because of prerequisite requirements, scheduling problems, or because they do not feel they can add a 1- or 2-hour course to an already heavy load of chemistry courses. Since the content of such a course is too important to the needs of the student to be ignored for these reasons, it would seem that the instruction should be available when the student needs it. The student's need may be the result of research activities, other course requirements, or assigned library problems in connection with a chemical literature course.

2. The instructional system should be located in or near the library where the information sources are located.

This feature allows the student immediately to consult the publications discussed, while the discussion is still fresh in his mind.

3. The instructional system should be so designed that it is available to a student even when no instructor is available.

The most obvious advantage to this feature is that it would provide at least a partial solution to the problem previously noted—namely, there are many schools that are not providing any formal instruction in the use of the chemical literature.

4. The instructional system should be made as flexible as possible to allow for variation in the students' needs or the institutional resources and purposes.

The audio-visual instructional system that has been developed at Eastern Michigan University is designed to meet these requirements. The initial system involved only the transfer of the introductory contents of a course in chemical literature to an audio-visual system located in the library. The "Audio-Visual Guide to the Chemical Literature" which has resulted consists of 28 units, each of which has an average running time of 10 minutes. The A/V Guide is designed so that the contents of any one unit may be studied without the expenditure of a large amount of time by the student before returning to the library source materials themselves. The brevity of the units also allows for an easier coordination of the library assignments with specific areas of content in the A/V Guide. The contents of the units are summarized below.

Table of Contents

The console (Figure 1) used to present the contents of the Audio-Visual Guide—"Audio-Graph" console No. 1624 (Gruber Products Co., Toledo, Ohio 43613), modified to allow for student control—is located in the record-listening room adjacent to the Science and Technology Division of the library. The audio portion is contained on a stereo tape cassette which is played by a stereo tape deck—Norelco C-60 stereo cassettes and No. 2500 cassette tape-deck—fastened to the top of the console. One track of the tape contains the audio portion, the other an electronic signal that advances the slides automatically. The recording was made using separate channels on a stereo tape recorder. A Kodak Carousel sound synchronizer (B-65) was used to place the slide-change signal on the tape.

The modified console houses a Kodak Carousel projector, which projects the slides onto a 16- × 24-inch screen, allowing the contents of publications to be viewed in considerable detail. Two jacks are provided on the front of the console for two earphones or a speaker. The slides may be focused, advanced, or reversed manually by the student operating the conventional carousel projector controls mounted on the top of the console. The on-off switch is wired to a thermal switch which allows the projector fan to remain on until the console is adequately cooled. One limitation of the console is that the slide carousel must be mounted and set manually by the student. Although the slides or tapes may be reversed independently of each other, no way has been found to modify the equipment so as to maintain the slide-tape synchronization.

The slides used in the A/V Guide have been selected to illustrate not only the internal contents of the publications discussed, but also their exterior appearance, so that the viewer will leave the console with some visual familiarity of the publications as he would find them in the library. It was felt that the use of slides, rather than filmstrips or film, would allow the contents of the A/V Guide to be modified and updated easily. The rearrangement of slides or insertion of new slides is achieved with considerably less effort and time than that involved in modifying a filmstrip. This kind of flexibility should be particularly attractive to other institutions anticipating the use of the A/V Guide materials, but whose instructional needs or resources differ in minor respects from those at Eastern Michigan University. It should be pointed out, however, that this flexibility is achieved at the expense of having a more compact system. The use of the more compact systems that employ filmstrip or film loops would be preferred in the presentation of material that does not require frequent revisions or updating (as for example: the use of the card catalog). Although the student console used at Eastern Michigan University is a somewhat sophisticated one, it is not a necessary requirement in the adoption of an audio-visual approach to instruction in the use of the chemical literature. The A/V Guide materials are well adapted to use with the kinds of audio-visual equipment already available at most institutions. For example, a student could listen to the audio portion on a monaural tape if the tape also included an audible signal to indicate when the slides were to be advanced manually by the student operating a conventional projector with a rear-screen viewing system.

Figure 1. Audio-visual console

The contents of the Audio-Visual Guide serve as the main instructional device in a one-hour course in Chemical Literature at Eastern Michigan University. The students' use of the A/V Guide does not constitute the total instructional activity in the course, however, since it was neither designed nor intended to supplant the kind of experience gained by the student when he uses the library materials himself. The students are also assigned individual library problems of the sort provided in Mellon's text.[3] The problems, however, relate to information provided in specific units of the A/V Guide. Present efforts are directed toward the improvement of these kinds of problems so that they can be used in a student workbook. The workbook would provide reasonably short and specific questions illustrative of the usual kinds of difficulties encountered in using the chemical literature. A teacher's (or student's) guide will also be prepared to accompany the workbook to provide additional suggestions concerning the kinds of difficulties to be expected and the nature of the information that should have been retrieved.

The course also includes a final written examination, the purpose of which is to determine the extent of the students' awareness of the content and use of a number of chemical publications. Although the test is at present only in a trial form, the general availability of a standardized and comprehensive test in chemical literature might be particularly useful. The most obvious application of such a test would be in obtaining data concerning the effectiveness of existing instructional systems in chemical literature. While the results of previous surveys[1, 2] of the status of instruction in chemical literature provided information concerning the content of existing courses or informal systems, the surveys were not able to provide more than inferential conclusions concerning the effectiveness of these instructional systems. A more specific application of a chemical literature test might involve its use by a research supervisor who wishes to ascertain whether an investigator possesses a general proficiency in the use of the literature before asking him to undertake a comprehensive literature search.

Students have responded most favorably to this approach, especially as regards their being able to view

the material and complete the problems at their own convenience. Only occasional lectures were scheduled for the purpose of discussion of problems and presentation of supplementary material.

Mention should be made of some of the alternative approaches that have been taken to the training of individuals in the use of library materials. At Southern Illinois University, the freshman orientation to the library is provided by means of a "teaching machine."[4] The visual display of library materials is incorporated into a written (or audio) programmed instructional system. Occasionally the programmed learning is reinforced by requesting the student to leave the console and locate information manually in specific library sources, such as the card catalog. With the recent availability of computers designed for instructional purposes, the programmed approach could be employed very effectively in the training of students in the use of the chemical literature. Preliminary plans have been made to incorporate some of the contents of the A/V Guide into the CAI system at the University of Texas at Austin. The CAI system will involve the use of computer instruction and testing in conjunction with components of the audio-visual approach discussed in this paper.

The use of written programmed materials for instruction in chemical literature has not received much attention, except as it relates to chemical nomenclature. However, an excellent programmed guide to the Beilstein treatise is available.[5] It may be hoped that the development of CAI and written programs in chemical literature will stimulate a greater concern on the part of information specialists with some of the usual and frequent difficulties students have in the use of chemical publications.

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Who's Teaching Chemical Literature Courses These Days?*

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This paper reports the results of a survey of the status of chemical literature teaching practices in 259 U.S. chemistry departments with graduate programs. A 90% useful response was obtained in the survey. About 40% of the responding institutions offered a formal chemical literature course. A profile of the course is given. At the remaining institutions, chemical literature is taught by a variety of methods and is integrated in other courses. The teaching emphasizes use of periodicals, indexes, monographs, government documents, and patents in order of decreasing priority. As measured by weighted priority means, the emphasis is comparable at schools with or without formal courses in chemical literature. A small decline in the number of chemical literature courses is ascribed to a faculty preference for integration of chemical literature in other courses or a belief that chemical literature is less important than other courses.

All chemists would agree that a chemistry major should acquire knowledge of the nature of the major kinds of primary and secondary sources, as well as have experience and proficiency in using as many as possible. How this worthy objective is achieved is subject to a variety of opinions. It may well be that the method of achieving this objective is not of primary importance. It does seem important to learn what methods members of our profession are using. This information would be of mutual benefit.

Accordingly, we have undertaken a survey on the status of the teaching of chemical literature. The last such survey was undertaken by a joint committee of the Divisions of Chemical Literature and Chemical Education, under the chairmanship of Professor M. G. Mellon.[7,8] The present

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