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Can You Teach Me To Do My Own Searching? Or Tailoring Online Training to the Needs of the End-User†

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The increasing computer literacy among technical employees in corporations coupled with the need to locate technical information in a constantly expanding volume of publications has made the prospect of "instant" access to computerized information sources an attractive alternative to dealing with a search intermediary. At American Cyanamid's Chemical Research Division (CRD), the training options include in-house courses prepared and delivered by the information staff and training by the database vendor. The training programs used and the results achieved with technical and nontechnical trainees, both on-site and geographically removed, will be discussed.

In offering training in the searching of external databases to the R&D staff of American Cyanamid's Chemical Research Division (CRD), the objective has been to provide the sort of instruction that would enable the researcher to carry out fairly routine, straightforward searches—to locate electronically the sort of information that might have been sought manually before. We felt and still feel that instruction in the basic commands and techniques for manipulation of an online system, taught against the context of the appropriate files, should enable the researcher to meet some of his information needs more efficiently and enthusiastically than would be possible with the hard copy. It was also hoped that the introduction of electronic techniques would encourage greater use of information resources by those people that for one reason or another do not use the library resources.

End-user training was first offered at CRD in 1980, in part because a few researchers had expressed interest in learning to do their own online searching but largely because it seemed to be an idea whose time had come. Researchers were using internal computer systems for monitoring laboratory experiments, for molecular modeling, and for database management. Instruction in the manipulation of external systems was a logical extension of the work being done on internal systems. Although we have experimented with on-site training by a database vendor and some end users have taken training from the vendor, there never was any question but that the majority of the end-user training program be designed and presented by the Cyanamid Technical Information Services (TIS) staff. We have been fortunate in having staff information scientists that are enthusiastic about teaching search skills and do it well. A just completed training session was a cooperative effort on the part of three information scientists, and any future efforts will also be a shared venture. Keeping the entire training an in-house operation allows maximum flexibility in scheduling class times, choosing course content, providing hands-on time and individual attention, and generally adjusting the pace of instruction to the needs of the participants. In short, "a do-it yourself" approach provides the freedom to adjust scope and pace to the needs of the participants—a most important consideration in any kind of training situation. It also firmly establishes the resident staff as resource persons in the minds of the novice searchers.

Except for two instances, which will be described later, instruction has been confined to the chemical databases, and the teaching format, with minor variations to suit the circumstances, is that conceived in 1980 by Joan Gallagher,[1] who was the Manager of Technical Information Services at that time. The formats of the various programs used will be reviewed and the results summarized.

Before beginning their instruction, the participants are sent two questionnaires. The first is of a general nature to determine the types of information that are of interest to the user—chemical reactions, preparations, uses; news about companies, marketing, products; patents, statistics, or publications to an author. We ask how often information is sought and for the sources most often used.

The second questionnaire is an assignment that is to be completed with hard-copy *Chemical Abstracts* (*CA*). The questions are intended to point up the sort of information that can easily be found by a manual *CA* search and that which cannot be so readily looked up. The questions are also structured to require the use of all the index tools—the *Index Guide*, *Formula*, *Author*, and *Subject Indexes* and *Patent Concordances*. Some representative questions are as follows:

Are there any references to the preparation of isocoumarin?

Find a reference to a paper that appeared in the *Journal of Organic Chemistry* on 4(5*H*)-oxazalones.

Is there a U.S. equivalent to Japanese Patent 7 831 844?

Note the index entries that will give all papers authored by Harry B. Mark, Jr.

Are there any references, since 1977, to the preparation of C_6H_5—CH=CH_2? Hopefully, this exercise also fixes in the user's mind the fact that there is, indeed, a relationship between the paper and electronic versions of *Chemical Abstracts*. The variety of answers and approaches to using *CA* is also quite revealing. Most of the students admit that they did not know *CA* as well as they thought they did! These same questions are used during the instruction, as in-class examples or

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homework assignments to be completed on the terminal.

Our first training attempts (in 1980) were given at both the Bound Brook, NJ, and Stamford, CT, locations of the Chemical Research Division—the Bound Brook staff elected to teach the SDC ORBIT system and the Stamford staff opted for Lockheed DIALOG. The decision was based largely upon the searchers' familiarity with and preference for a particular system. Subsequent instruction in bibliographic searching has usually been on the DIALOG system, again because of staff preference. Obviously, the quality of the instruction is directly related to the instructors' command of the system and knowledge of the database and of the work from which it is derived. The variety of databases on DIALOG also meets any needs our users might have for information not covered in *Chemical Abstracts*.

The courses are planned to be given in three sessions of about 2 h each, not more than 2 days apart. This format provides for supervised hands-on time at the end of each class, gives the student time to practice and do the homework, but yet keeps a certain momentum going from class to class. If the sessions are too far apart, people tend to forget what they have learned, and too much repetition is necessary. Subject matter taught is divided among the sessions as follows.

Session I covers the following topics: overview of DIALOG system, *Chemical Abstracts* databases (bibliographic), unit record/basic index (hard copy vs. online version), basic search commands, Boolean operators, logon and logoff, and troubleshooting (interpretation of error messages). The search commands taught in this session were begin, expand, select (superselect), combine, type, print, and end/save. Output formats were also described in this session. Logon/logoff are the last things taught so that the procedure will be fresh in the students' minds as they go to practice an assigned question on the terminal. The session is concluded with a demonstration and hands-on time for each participant. Questions are provided for immediate practice as well as a set for "homework", to be competed before the next class.

The second session opens with a discussion (and demonstration) of the various approaches taken to complete the homework assignment and then covers truncation and variable character symbol, full-text operators [(*w*),(*1*)], prefix and suffix codes, *CA* section searching, and limit. This session again concludes with terminal practice and distribution of a homework assignment.

At the third session, the previous assignment is discussed followed by an introduction to the databases: CHEMNAME, CHEMSEARCH, CHEMSIS, CHEMZERO, CLAIMS, and CHEMICAL INDUSTRY NOTES.

Needless to say, one cannot cover these databases in depth in one 2.5-h session. The prefix and suffix codes unique to these files are explained, and the capabilities for information retrieval are compared to searching in printed *Chemical Abstracts*, at least as far as chemical compounds are concerned. A great deal of detail is not presented, but the class is made aware of the fact that the commands and techniques are transferable from database to database. For aid in search-strategy formulation, particular emphasis is given to the existence and value of search aids such as database chapters and the "blue sheets", DIALOG's summary of record content, search qualifiers, and sort/print options.

At this point, the trainees are given the option of additional supervised hands-on practice with questions of their own or are free to go it alone. When the course was given to chemists at Cyanamid of Canada, instruction had to be compressed into a 1-day session, but the format of instructional lecture/hands-on practice/instruction/hands-on practice was still used. The preliminary *Chemical Abstracts* assignment and homework could not be required since library resources are limited at this location. However, the lack of on-site resources is probably the motivation that keeps this group searching actively. Many examples were used throughout the lecture, and time was spent with the group working through questions of their choosing. Since two instructors worked with a total of six people on two terminals, everyone had a chance for considerable hands-on practice.

For each course, a series of handouts are prepared, designed to be used as an aid in search planning or a ready reference guide, to be taken to the terminal for quick look-ups or a command refresher. For a 1-day session, the sheets are spiral bound into a workbook; for a series of classes, the relevant notes are passed out as the material is covered. The sheets are prepunched, and a binder is supplied. The homework assignments complete with solutions are also part of this package.

On two occasions, a Chemical Abstracts Service representative has come on-site to teach CAS ONLINE substructure searching in a 1-day workshop. For this course, no assignments were used; chemists were merely encouraged to bring structures of interest to them for hands-on practice. The lack of use of this system has been the big surprise of our training experiences. It would seem natural for the chemists to welcome the substructure approach since it works by matching atoms, bonds, and elements to pull together structurally similar compounds, but such is not the case. The chief complaint of the trainees was that too much information was packed into 1 day, with not enough practice and "digestion" time. The fact that the more complex text input rather than graphics input was taught may also have contributed to the confusion. If substructure searching is offered again, it will be an in-house series put together by TIS staff, again teaching text input but perhaps linking the substructure approach with the bibliographic searching capability now offered by CAS ONLINE.

Our experience in training patent attorneys to search the PATLAW database was also something of a letdown, although the results with this group were not unexpected. The attorneys' interest in online searching had been piqued by a publicity barrage from DIALOG Information Services announcing instruction and free time in the PATLAW database. When an in-house training program was proposed, six "students" immediately came forward, all of whom were quite familiar with *U.S. Patents Quarterly* and used it regularly—manually. The same three-session format was followed, of course with the PATLAW database as the vehicle for examples and demonstrations. Basic DIALOG searching was taught with qualifiers, codes, and subject coverage unique to PATLAW. The third session was devoted entirely to supervised hands-on time. Some searching took place during the first month; by the third month, online time had fallen to zero, and not one of the six attorneys has used the system since.

At the request of the Patent Law Department, a course in searching for patent equivalents on the Derwent files was given to seven secretaries from the department. This was a half-day session, beginning with introductory remarks about the concept of patent families and including Derwent's coverage of same and SDC ORBIT as the system vendor. There followed a basic step-by-step explanation of input formats using patent numbers or application numbers and the "print full" option for output display. Logon/logoff were demonstrated immediately before supervised hands-on practice. It was impressed upon this group that input giving negative results was to be checked for errors and discussed with a TIS searcher and that this file is not the ultimate source for this type of information. When completeness is essential, other sources are available to the TIS staff. Nevertheless, the results with this group have been gratifying—they are steady users; therefore, at the de-

Table I. Extent of Training

	database	no. of trainees
chemists	DIALOG	26
	SDC	22
	CAS SUBSTRUCTURE	9
attorneys	PATLAW-DIALOG	6
secretaries	Derwent equivalent	7

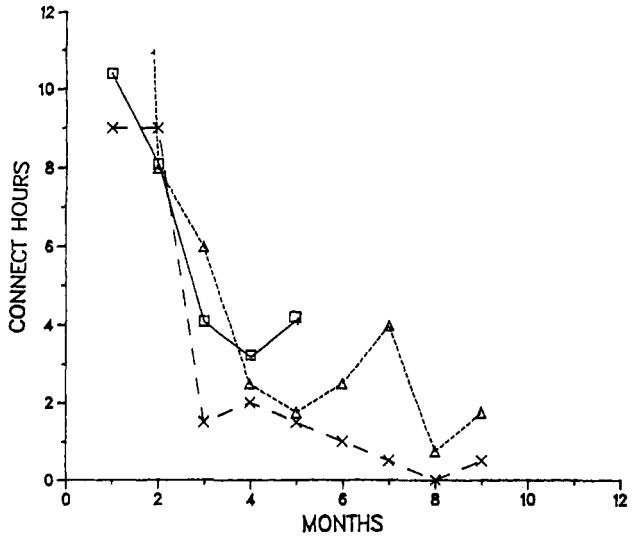

Figure 1. Chemical database searching: (△) SDC users; (×) DIALOG users; (□) Canadian users.

partment's request, training in searching for patent equivalents will shortly be given to all interested Patent Department secretaries. The extent of training efforts to date is summarized in Table I.

The total technical population of the Chemical Research Division is about 500, so the pool of potential trainees has barely been tapped. The students do represent a cross section of disciplines—organic, physical, analytical, and polymer chemists, engineers, and legal and regulatory personnel. All ages and degree levels have also been represented in the various classes. Most of the trainees to date have come forward to express interest in learning to search. Lately, however, at the end of a TIS orientation seminar that is given for new employees, following the demonstration of online searching, an offer to train is made. This produced close to a dozen volunteers, just about the maximum number for a good session. Keeping the class small makes it possible to give a great deal of individual assistance during hands-on practice.

How successful have these training sessions been? When the end-users' level of usage in connect hours is plotted against months from the time of training, a certain similarity among the groups emerges. Of course, connect hours are not the most reliable measure of usage; a novice requires more online time than a more experienced searcher, and trainees spend a great deal of time in practice for its own sake. Over a period of months, changes in staff such as transfers or resignations also account for some of the fall-off.

Nevertheless, after an initial spurt of enthusiasm, usage definitely falls off (Figure 1). In each case, the ongoing usage is usually on the part of one or two searchers, the majority having given up after the second or third month. It is too early to say much about the continued usage of the end users at our Canadian facility, but I suspect they will be the most creative (in terms of files accessed) and consistent (in terms of degree of usage) searchers, since they do not have on-site access to information professionals or a technical library. In the few months in which they have been searching, a significant amount of time has been spent searching 18 files in addition to *Chemical Abstracts* and other chemical databases, and all

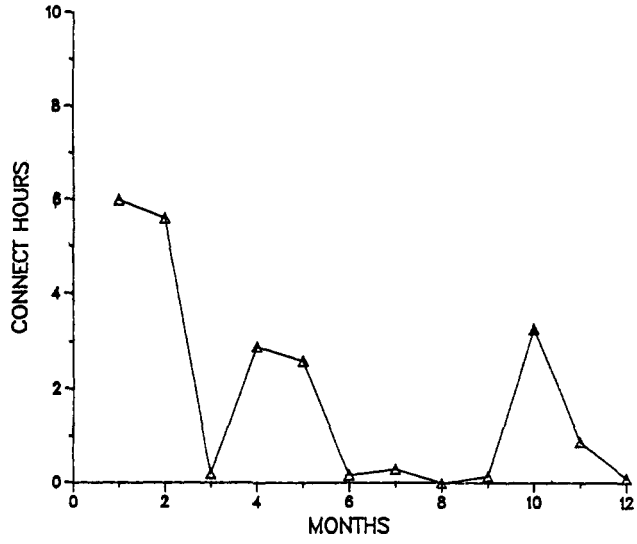

Figure 2. CAS ONLINE usage.

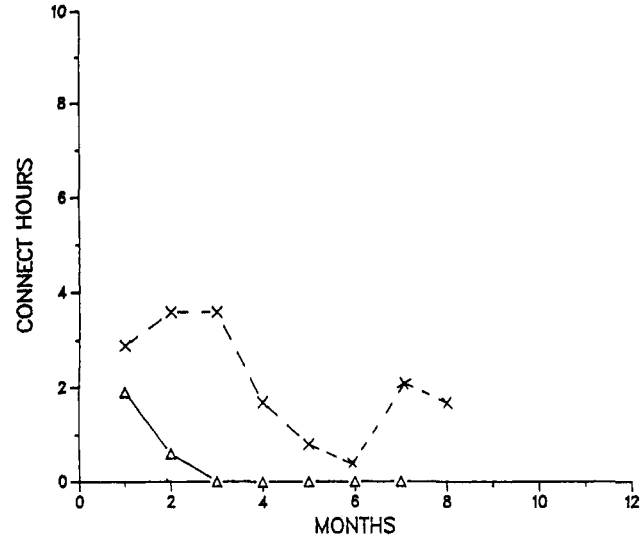

Figure 3. Patent Department usage: (△) attorneys; (×) secretaries.

of the six end users try to do at least two searches per month. The CAS online usage (Figure 2) is somewhat more erratic, with all of the activity due to two searchers.

The attorneys totally abandoned online searching very quickly (Figure 3), while their secretaries keep up a steady volume. This usage represents activity by four of the original seven.

If success were only to be measured in terms of degree of usage, the results would be really dismal. The fact that there is a core of user–searchers that has emerged from these training efforts makes continuation of the program worthwhile, because part of the Technical Information Services mission *is* to increase the client's access to information. All of the trainees also seem to develop a new respect for the skills that an information scientist must have to function effectively. It becomes apparent to them that knowledge of subject, source material, and database structure and content is more important than merely knowing a few commands and being able to operate the machinery. There is also greater appreciation for the thought and planning that must go into the execution of a good search. Our users now realize why a search takes longer than 5 min even though there is a computer involved. All of this insight and understanding leads to more, and more effective, use of information resources; the user–searcher is more aware of the resources available, how they can be of help to him, and how they can be tapped most effectively. Although it is not the primary intention, end-user training is also an

excellent public relations vehicle.

Why, after their initial enthusiasm and eagerness to learn, do the end user-searchers not make greater use of these systems? It is obvious from the literature[2,3] that there are a variety of approaches to training end users, but there are certain factors that must be present as far as the end user is concerned, in order for the training to "take"—that is, to keep the user-trainee searching.

First of all there must be a *need* for information—with most researchers, this need is not sufficiently constant to allow them to use online systems as often as is necessary to keep search skills sharp. There are certain stages in a research project that are information-intensive. There is a great deal of information activity at the beginning of a project, and then, as research progresses, more limited periods of activity mark problems or changes in direction. Ongoing information needs are met by scanning current journals or by a selective dissemination of information service that automatically generates new references to update a previously stored search strategy. Thus, without the opportunity for constant practice, especially for new users, every search becomes a relearning situation—very frustrating and time consuming. There must also be *motivation* to continue to use the newly learned skills. Our users feel that the complexity of the systems and database structure, together with the availability of excellent service from the search staff, reduces the motivation of "do-it-yourself". Where there are no library services readily available, as with the Canadian group, motivation is higher. Lastly, *interest* in doing one's own searching is important. Most researchers simply find their own work more interesting and demanding. Online searching can be productive, but if it cannot be done easily and well, researchers lose interest and will not take the time from their regular work to pursue searching. Most of our continuing users have no illusions about their skills—they use the systems for general information, to find a few references to "tide them over" till a searcher can fill in more detail, or for an overview to give them some idea of what is going on in a particular area of technology.

It is heartening to learn that the Cyanamid experience is not so different from that reported in other companies. The information needs of the end user are generally not sufficiently constant or pressing to warrant taking time away from primary responsibilities to become and remain reasonably adept at online searching. No matter how the training is structured, end-user usage quickly falls off, leaving a small number of users that search with some sort of regularity.

Having said all that, will end-user training at Cyanamid continue? Definitely! As long as there are users in our organization that feel they could profit by self-searching, instruction geared to their needs will be provided!

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Meeting the Needs of the End User

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Performing a computer literature search has traditionally required an information specialist or librarian to perform the search. As the demand for more information increases, the person requesting the information, an "end user", is becoming more involved in the search process. The experiences and guidelines DIALOG uses in training the end user in searching computerized chemical information are discussed.

How can we best meet the needs of the end user? Unfortunately, neither the question nor the answer is straightforward. The underlying difficulty with this question is that the term "end user" covers a broad spectrum of information seekers with diverse needs. In order to attempt to meet their needs and assess the value of doing so, three things should be established about end users.

(1) Who are they? Where do they come from?

(2) What do they need? Do they want what they need and do they need what they think they want?

(3) Where will they go from here?

Answering questions two and three seems to return us continually to question number one. Who are the end users, how do they differ, and how are they alike?

In the discussion that follows, the term end user has been defined as someone who is not an information professional but desires to do his or her own information searching. For the purpose of this paper, a further qualification has been placed on the end user in that we will be discussing scientific end users who must have a chemical or physical science background. This is because end users from other disciplines (medicine, law, business, etc.) have also been learning to do their own

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