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THE END-USER: AN ASSESSMENT AND REVIEW OF THE LITERATURE

D. NICHOLAS* AND J. HARMAN**

School of Librarianship and Information Studies, Polytechnic of North London, UK

ABSTRACT

It is argued that end-users are an ever-increasing and potentially enormous market for online information systems. Yet it is not clear how widespread end-user searching is already; what makes some people do their own searching, but not others; what problems they encounter when conducting online searches; and whether technical developments in the pipeline are likely to make the intermediary redundant.

A review of the literature is undertaken to discover whether researchers are providing us with answers to these and related questions. Their findings—contradictory in places—indicate that: end-user searching flourishes most in fields where users were active searchers of manual/hard-copy services; the prospect of total and unimpeded access to information is not as potent a lure as many have thought; and that end-user searching poses little immediate threat to the intermediary.

End-user searching is on the increase and will constitute the predominant method of retrieving information in the near future? Evidence is hard to come by but database producers—with a greedy eye on this potentially enormous market—would not have us believe otherwise. As a result, the role of the intermediary or 'professional' searcher will, before long, be redundant (worse-case scenario), or limited to that of consultant and adviser, doing only those searches which are very complicated (best-case scenario). Proponents of the latter case such as Meadow (1979) of OCLC are fond of drawing analogies with computer programming: while in the 1960s programming was the province of a few technical wizards, today a significant and increasing percentage of the population are able to write their own programs. This could only have happened with the development of high level languages such as BASIC. In the same way it is argued that the emergence of simplified query languages, along with an overall increase in computer literacy and improved access to terminals has created the right climate for end-user searching. Or has it? Who are these end-users and how widespread is their use of online facilities?

* David Nicholas has published books, reports and articles on bibliometrics, communication in science (immunology and virology), commodity futures, computerized information systems and the literature of the social sciences and humanities. He is a senior lecturer at the School of Librarianship and Information Studies, Polytechnic of North London. He is also supervisor of the research project 'Information skills in an information society', from which this article emanates.

** Jennifer Harman is a research assistant working on the 'Information skills in an information society' research project.

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By and large what emerges from the published research is that there are so many factors determining whether users subscribe to, like, or regularly use online information services that it is impossible to draw firm conclusions as to who the future users will be, or how many there will be. What is clear, however, on the admittedly scant evidence, is that the future for the intermediary is far from bleak.

Bennett (1977) set out some of the unanswered questions regarding end-user searching: can a system be designed for the general public? What are the characteristics of the user served by the facility? Is the assumption that end-users are less motivated to do their own searching valid? Will the end-user use the online facility enough to gain expertise? Will it be used enough to be cost effective? The intention of this paper is to discover whether the published research yields any answers.

END-USER SEARCHING IN THE ACADEMIC ENVIRONMENT

Studies of student searchers in North American universities have revealed that students are enthusiastic about doing their own searching, despite a lack of speed and a tendency to make errors (Bonta, 1983; Fjallbrant *et al.*, 1983). One study of librarianship students, designed to discover the difference in undertaking the same search using both online and printed source methods, resulted in differing results and differing perceptions of the process, despite the identical objective (Schuman, 1982: 518–519). It found

> without exception, and to no one's surprise, students perceived database searching . . . as fascinating, futuristic, sexy, efficient, potentially revolutionary . . .

Students, however, considerably resented the cost factor although they were getting an educational discount:

> you sit there helplessly watching your funds transfer to someone else . . . whenever there's a 30 second delay on the system you want to yank the telephone out of the coupler, if only to stop that relentless meter.

Nevertheless online searching was preferred by a two-thirds majority.

Conversely, another study revealed that end-users preferred to have their searching carried out by intermediaries because of the difficulties associated with searching protocol (Hurt, 1983). Schwerzel *et al.* (1982) asked faculty members and students to evaluate their competency in searching after a basic training period: they revealed self-confidence in the mechanics of searching but less confidence in their ability to formulate search strategies. Exploring the issue of motivation Charles Meadow (1977) observed that end-users most likely to perform their own searches are persons comfortable with computers and computer systems. Indeed a study of student searchers reported that those who knew about microcomputers and programming initially believed that online searching would be 'a cinch'. The results, however, proved them (and Meadow) wrong. 'There is a tendency amongst such searchers to confuse programming skills with the quite different requirements Boolean logic imposes in an online search' (Janke, 1984: 21).

Database producers, in an attempt to encourage end-user searching, have directed their efforts towards developing computerized instructional packages as

well as alternative man/machine interfaces which simplify the searching process (and, some would argue, make it less effective). One system implemented at George Mason University involved a computer-assisted instruction package (Grotophorst, 1984) which introduced novices to the techniques of searching and helped them understand Boolean logic, truncation and proximity searching. Results so far indicate that the package has helped users to a fuller appreciation of a retrieval system's capabilities and limitations, which in turn has led to an improvement in the quality of the requests given to the library. Systems designed to facilitate the searching process include TRAINER (Caruso and Caruso, 1983), a computer tutorial for users of Dialog and Orbit, and Search Helper, a package which enables the user to enter a search on a microcomputer, which is then connected to the host system only for the actual searching (Ensor and Curtis, 1984).

By encouraging familiarity with searching at undergraduate level it could be inferred that database producers and vendors hope to influence a new generation of searchers, who will take their newly acquired skills into the employment arena.

Libraries too (despite the underlying threat) have been active in encouraging the end-user, particularly academic libraries in the USA and Canada. Janke (1984) largely attributes the recent rise in end-user searching to aggressive marketing directly to end-users, discussions of after-dark services in the popular computer press and an awareness on the part of librarians that end-user searching is here to stay. Janke provides an account of the University of Ottawa's own service Online After Six, which allowed students to do their own searching in the evenings on the BRS/After Dark Service (providing low-cost searching outside peak hours). After an initial one-year period it was clear that online information retrieval was becoming fully integrated with everyday reference activities and that a blurring in the distinction between manual and online reference was being witnessed. By the end of the survey 15 per cent of all online searches done at the University's Morisset Library were being conducted by end-users.

However, it was once again observed that many end-users were experiencing difficulty formulating search strategies and coping with Boolean logic. As a result pre-search counselling service was introduced—and it proved effective.

Trzebiatowski (1984) also featured the BRS/After Dark Service in a study to test the feasibility of offering an end-user search service in a university library. Although the searchers—teachers, graduate and undergraduate students—rated their searches as satisfactory and were enthusiastic about the service, the need for education and guidance was paramount. Problems encountered included the inability to: analyse the concepts in a search statement and gather the appropriate terminology; use Boolean logic; select appropriate databases; evaluate the results and modify the search strategy accordingly. The report concluded:

> the use of *BRS/After Dark* still demands background knowledge and skill in order to perform a successful search . . . . The truly user-friendly system will be an artificially intelligent or knowledge-based system that will be totally interactive and offer online user assistance (Trzebiatowski, 1984: 450).

A well-favoured method of establishing the worth of an online facility to the end-user was featured at the University of California (Bodtke-Roberts, 1983).

Here faculty members were given four months' free searching time on Biosis, followed by four months at normal rates. Observation of searching behaviour revealed that after the free time ran out usage declined dramatically (97 per cent), with cost given as the main reason. However interviews with the subjects revealed satisfaction with the searches carried out during the free period: they liked having immediate access to the system and not having to explain their needs to an intermediary. These positive factors were not though enough to prevent their ceasing to use the system once they had to start paying for it. Patently, cost is a major deterrent. While students and teaching staff can be encouraged to do their own searching—and may positively enjoy it when they are part of an experiment paid for by the educational institute and/or database producer—they are highly unlikely to utilize the technology in their information-seeking, when they have to start paying. But given the opportunity to become effective searchers at reduced rates it is just conceivable that today's student end-users will become tomorrow's work-force end-users.

END-USER SEARCHING IN THE NON-ACADEMIC ENVIRONMENT

The information needs of faculty members and students are readily identified. They are, usually, working in one subject area, with specific problems to be solved, or hypotheses to be investigated and are generally highly motivated towards information acquisition. Information-seeking in government, industry, banking, law, etc. is on the other hand a means to an end, whether that end be the production and distribution of wealth or serving the government and people. Formal information sources take a back seat; information gathering is a haphazard affair with many people unable to recognize that they even have information needs. A number of attempts have been made to understand the online behaviour of users in the non-academic world, and because of the more testing environment outlined above, probably provide us with a far more realistic picture of end-user searching. While some writers are convinced that managers, practitioners and researchers will appreciate being put in direct touch with the datastream and the flexibility to change ideas as the search progresses without having to translate the query for an intermediary (Haygarth Jackson, 1983), others believe that end-users have neither the time nor the inclination to learn how to search (Thompson, 1983). Writing recently Charles Citroen (1984: 547) claimed that

> present day online systems often need complicated access procedures, require extensive training and continued study to be used efficiently, too often change their software, coverage and pricing policies, do not offer sufficient local assistance and can induce very costly errors.

Three studies carried out around 1980 shed some light on the problems of end-user searching. A project at Raytheon (Richardson, 1981), a major US supplier of military sonar systems, was designed to test the hypothesis that end-user searching is more efficient than intermediary searching. After an in-depth training session engineers were given seven months' free searching time followed by five months at full rates. Despite the fact that the engineers claimed to comprehend fully the mechanics of searching, usage was astonishingly low (only 10.5 per cent of free time available was taken up) and dropped dramatically during the full billing period (to approximately one-seventh of the previous level of use). Why? By making access to information relatively easy the

project designers had thought the system would be used. But engineers (in common with most practitioners) tend to be results-oriented, not information-oriented; a new retrieval system, no matter the form, will not in itself provide the incentive to seek more information.

> We have no evidence that any participant experienced a profound transformation in his attitude towards acquiring and using technical information (Richardson, 1981: 48).

The report concludes

> From this experiment we would expect a high initial enthusiasm, a period of settling out, and a final cadre of dedicated, proficient users . . . . Some will respond positively and intuitively, others will be tentative and uncomfortable. Librarians and information professionals themselves are not uniformly proficient online searchers, and it would seem reasonable that a similar range of skill will be observed among groups of scientists and engineers (Richardson, 1981: 48–49).

In the second study, Exxon (an oil company), gave all those interested from the most senior chemists through to the secretaries, the opportunity to learn searching techniques (Walton, 1983). Surveys carried out six weeks after the introductory training course and a year after that revealed low usage levels; even those who had expressed initial enthusiasm were not using the facility. Low use was attributed to

> The realisation by some end-users that online searching was a difficult and challenging skill, requiring time and effort to master, was enough to convince them not to search (Walton, 1983: 49).

They were discouraged by the careful preparation that proceeds the search and the logic in its execution. Also the author points to the inherent problem associated with end-user searching that

> even a well-motivated end-user with sophisticated searching skills will generally not have the need to search very often. And yet practice is necessary to maintain skills (p. 49).

Despite the lack of enthusiasm (and seemingly flying in the face of the evidence), the authors suggest that end-user searching should be encouraged and that it will become, 'once the technology has advanced to the point that the entire search process is done automatically by a black box' (Walton, 1983: 50), a common method of information retrieval.

EasyNet, a recently announced project of Telebase Systems Inc. and the National Federation of Abstracting and Indexing Services, shows how far we have come in developing that 'black box'. Known as a 'gateway' service, Easy Net provides for a common approach to host systems such as Dialog, BRS, Orbit and Pergamon InfoLine; selects the most appropriate database for the search; and even dispenses with the need to keep accounts with the individual online systems—all the user does is to enter a credit card number every time they log on (Tenopir, 1985).

The third study—again in the sci-tech field, this time at Kodak (Haines, 1982)—appears to contradict these findings. Over a twelve-month period, 1979–80, online searching by end-user chemists actually increased with the searchers reporting satisfaction with their self-conducted search sessions. 'Chemists are being paid to do research', state the researchers.

> If an online searcher can accomplish in one hour what previously had taken a day or two using printed sources, one hour of online time by a chemist could save many weeks, even months, of time in the laboratory (Haines, 1982: 18).

This experiment demonstrated more than anything else that end-user searching is feasible and can be valuable, given favourable conditions—a group well versed in literature searching and a literature that is well organized.

Busy practitioners, deprived of the large document collections servicing their academic colleagues, are more likely to respond favourably to information systems providing factual data and the full text of documents than to bibliographic systems which provide only signposts to potentially valuable items (and which in most cases they do not have readily to hand). Or so the story goes. Certainly the relative successes of Datastream with the business community (the database records around 23000 accesses per day), and Lexis with lawyers would lend support to this argument. And, of course, stock and commodity exchange services, like TOPIC, and wire services, like Reuters, have always been the monopoly of the end-user.

Research has been carried out by City University (London) on Datastream (Eckersley and Rennie, 1984), a databank holding information on company accounts, share prices, currencies, interest rates, etc., to discover who used the service and whether information professionals were involved. It transpired that the service was used by business executives who normally made little use of the published literature. For them the principal attractions of Datastream were that it saved time and provided information directly applicable to their jobs. Of the twenty-one City firms studied none employed information professionals to operate Datastream: the users were all financial professionals—primarily junior executives who had been delegated the task and who understood the data they were accessing and manipulating.

Much of Datastream's success can be attributed to its ease of use: throughout its development this was always considered important. Interestingly, now that its first users are established in senior management or board positions (and thus removed from direct contact with the service) they are recruiting people with specialist skills to get the most out of Datastream (and at over £20000 per year there is every incentive). This in turn has created a demand for more sophisticated information-handling facilities, which Datastream is busy meeting. Dialog, in comparison, has operated very differently: having started with a relatively sophisticated (and powerful) search language they are now, through Knowledge Index, introducing a simplified service.

It is from the success of Lexis (the legal full-text database) that we can probably learn most about the conditions in which end-user searching will flourish. Unusually, this success story (6000 users trained in the UK alone) is poorly researched; most of the material on Lexis is rather descriptive (Menanteaux, 1982; Kavass and Hood, 1983). A review article by Larson and Williams (1980) provides the best account but it is now rather dated.

Some hard figures on Lexis (and Nexis) emerge from a recent interview with J. W. Simpson of Mead Data Central, conducted in the pages of *Online* (Pemberton and Emard, 1984). Mead claim to have over 6000 accounts, a trained user base of 200000 people, and having taken 10 years to get 3500 accounts doubled that number in just one year (1983). Despite this growth Simpson feels that Lexis has only achieved 10–20 per cent of its potential

market. Having initially turned their backs on the information professional, Mead are now adopting cost structures that are designed to be attractive to them. One wonders whether the move is opportunist or signifies a downgrading of Mead's estimates of the size of the end-user market?

In the light of the limited research conducted on Lexis, it is probably worth speculating on the reasons for its success. First, and perhaps most significantly, the high hourly rates charged by legal firms make online searching costs seem positively cheap by comparison—and anyway the cost can be passed on to the client. Secondly, the alternative—hardcopy searching—was never very effective given the lack of a single source to law reports, the inadequacy of indexes to law reports and the sheer size of the literature. Additionally, by definition, it is the past literature with which lawyers are most concerned and it is for searching this literature that online services are best. Indeed, it is interesting to note that Nexis, Mead's current affairs service, has apparently failed to capture the media market in the same way: journalists and programme researchers, unlike lawyers, are largely concerned with what is happening now and databases can only be of limited help. Thirdly, the literature/document search is an essential part of legal work. Not surprisingly then lawyers, familiar with their literature and possessing the ability to formulate searches, experienced few difficulties in mastering the online service. Fourthly, lawyers have a considerable trust in the literature—more so than other professional groups such as journalists or stockbrokers. Fifthly, the legal language is relatively precise and well defined, therefore full-text/free-text searching poses fewer problems for the searcher. One other thing Lexis has taught us is that a high level of computer literacy is not a prerequisite for an online systems success: indeed a few years back it would have been difficult to name a group further removed from the world of IT than lawyers. As a final testament to Lexis's success, it is now said that telling a judge that a search has been conducted on Lexis is beneficial to one's case. In conclusion, it is doubtful whether the success of Lexis can be repeated anywhere else for no other group appears to possess the same set of characteristics.

Encouraged by the notable successes of Lexis and Datastream some writers have begun to write the epitaph of the intermediary. Jones (1984: 217) for instance states

> the evolution of the professional online searcher must be regarded as a temporary aberration.

Perhaps this is a little extreme. End-user searching surely does not mean the end of the firm's library or information service. What it might mean, however, is that end-users will do their own more straightforward searches on a single familiar database, calling upon the professional for the difficult more wide ranging ones. Let Charles Meadow (1983: 1622) put the case for the online professional:

> Does the family car have the performance characteristics of a race car or Greyhound bus? Could we handle it if it did? Can I, the family consultant on cuts and bruises, do surgery? Do I need a lawyer for every dispute I may have with a shopkeeper? Of course not. I handle the easy, general uses, and the experts handle the difficult cases.

This view is increasingly finding favour in the professional literature and introduces, at last, a degree of commonsense into the whole debate.

THE CONSUMER AS END-USER

It is here more than anywhere else that the well-laid plans of the information providers have gone most awry. As Prestel has learnt to its cost, advances in information technology may be lost on a public whose appetite for information and whose information handling skills are not known or understood. Clearly the implications and ramifications of putting the home user in direct touch with a datastream have been overlooked in the general rush to sell into the largest, if not most lucrative, market of them all.

In the attempt to provide easy, general use of information retrieval systems database producers have produced a number of systems which can be utilized by end-users with a home computer, modem and, supposedly, no information-handling skills. The Source and Compuserve offer financial information, travel guides and booking services, newspapers and magazines; customers can send electronic mail to each other, peruse a bulletin board and join special interest groups which allow subscribers with the same interests to get together and hold online meetings. Subscribers can go online shopping, rent holiday homes, buy and sell merchandise. Compuserve was originally established to provide business information, the alternative services being made available outside office hours. The extent to which these services have penetrated the home computer market is not easily ascertained, but it has been suggested that

> typical customers have high incomes, are well educated and fit a professional/executive profile (Howitt and Weinberger, 1984: 400).

Our initial researches confirm this. Dolan (1983), writing in *Database*, has argued for the increasing popularity of services such as The Source and Compuserve. She makes no such strong case for Dialog's Knowledge Index or BRS/After Dark Service, which she rightly affirms were not established with the consumer market in mind—and as such will not make great inroads into this market. They are spin-offs, developed in response to the growth in home computers. Knowledge Index is a simplified version of Dialog's Search Service, aimed at home users with no experience in online retrieval. No training or demonstrations are given; however a User's Workbook is included with the subscription. But how many people are likely to buy access to a service they have not seen in action? (they are provided with two hours free time after having enrolled). Furthermore, a number of novices are surprised when they find they do not have access to the full text of a document or article.

> Not until we have databases which are of, by and for the people, will the present systems be truly user-friendly

says Dolan (1983: 104). Commenting too on Knowledge Index and BRS/After Dark Tenopir (1983: 474) states that

> While these simplify the search process they do not compensate for the lack of skill and knowledge of the user. Searching is indeed more simple from the user's standpoint but the power of the systems is diminished and the complexities of searching are merely masked by ignoring them.

Viewdata systems—for example Prestel in the UK—offer a cheaper, more straightforward approach to meeting consumer information needs. However, so far such systems have not proven highly acceptable. A British Library survey carried out in 1980–81 aimed at discovering the general public's reaction to

Prestel and its potential for conveying local information (Yeates, 1982). Its use was monitored in public libraries throughout the UK and it was found that users would approach the system with high expectations only to be disappointed as their familiarity with it increased. It appeared that Prestel was most heavily used to obtain business information. The report concluded that

> Prestel has not yet found a satisfying niche amongst the other media (Yeates, 1982: 4).

All involved agreed though that there was enormous potential for the provision (but perhaps not use!) of local community information. Another study of Prestel was carried out by the National Consumer Council (Scott Maynes, 1982), who commissioned an American researcher, unfamiliar with UK terminology and trade names. This unfamiliarity proved a major stumbling block and he was unable to find answers to even the most simple queries! By 1985 it has become clear that Prestel has not take off in the UK as a consumer information resource, and price sensitivity seems to be the major reason. Of the present 600000 subscribers 35000 are private; the remainder are business subscribers. It is difficult to see the situation improving for Prestel.

Leicester's Central Information Bureau has explored the use of public computer facilities by developing their own systems (Maguire, 1984). ISLA (Information System for the Leicester Area) was established in 1979 to determine the public's readiness for, and success in using a computerized information system. The DEVIL experiment (Diary of Events in Leicester) in 1983 examined the possible roles of an information service within an information bureau and the use of a touch sensitive screen as an alternative to a conventional keyboard. By studying the way users interacted with, or ignored, the system the authors concluded that Leicester's general public

> were interested in computer-based public facilities but exhibited a healthy disrespect for them (Maguire, 1984: 209).

One interesting, and probably predictable, result was that use doubled from the 1979 experiment to the 1983 experiment, from an average of 11 users a day to 27.

> It seems that the general public is much more confident in using computer facilities on a casual basis as their experience of them increased (Maguire, 1984: 211).

In the development of viewdata and teletext systems the USA lags behind the UK. Nevertheless research over the past two–three years has pinpointed the problems of consumer information services. A teletext trial in Washington in 1981–82, carried out by the Alternate Media Center, showed that

> the levels of skill and general social behaviour among teletext users at the public sites are sobering for those who believe that general computer literacy is just around the corner (Elton and Carey, 1983: 166).

The authors of the report point out that

> a concept such as 'enter' which is second nature to a computer person is by no means obvious to the uninitiated . . . . It is a new concept and must be learned (Elton and Carey, 1983: 167).

But they go on to say that teletext services will be in common use years ahead of their much more sophisticated rivals and will prepare the way for them—as perhaps Oracle and Ceefax are doing in the UK.

Channel 2000 is the North Americans' answer to Prestel. Developed by OCLC, a pilot test was carried out in 1983 (Bolton, 1983). The aim of the test was to find out why an individual chooses or not to use videotex (as viewdata is called in the USA) technology. As in the case of the Prestel experiments the results showed that Channel 2000 was perceived less favourably as the participants gained more experience. Asks Bolton

> Can videotex offer services that actually are superior to the experience of going to the library, reading from a book or newspaper, talking on the telephone? (Bolton, 1983: 152).

Until such systems are more compatible and are perceived to be more advantageous than traditional sources they will not be adopted on a wide scale, certainly not when an additional financial premium has to be paid. The Director of Archives at the *New York Times* also subscribes to this view (Rothman, 1984). He maintains that prospective users (of tele-reference services) are waiting for a sufficiently large and varied supply of services at a reasonable price, while prospective suppliers are waiting for sufficient demand, and also that there is a world of difference between playing a computer game and getting data efficiently out of The Source or Nexis (a point lost on many analysts).

> It seems reasonable to conclude from all this that it will be many years—probably 20 or more—before tele-reference services in the home will be sufficiently widespread to affect the use of non-electronic information sources in the home or library (Rothman, 1984: 790).

The information revolution seems a long way off.

CONCLUSION

With the technology already available to provide users in their own homes or offices with information resources and facilities unavailable to even the largest academic or national library say six years ago it is plain that a new information age is dawning, but whether this age will be that of the end-user, free from the problems of access, is uncertain.

> With a terminal at one's desk . . ., the ability to read full-text online, an efficient way to obtain hard copies and an essentially transparent user interface, online retrieval becomes close to Ultimate Access

states Richardson (1981: 50). He is, however, far from convinced that by overcoming the problems of access you inevitably unlock the flood gates of end-user searching, or even 'transform the information center/client dynamic'. In support he points out that 'few people operate in a truly information poverished mode' and that there are 'too many alternative information channels, not necessarily optimum but certainly effective', and, of course, very acceptable.

Strong cases for the end-user can be made in law, certain areas of business, and in academia when the online facility is provided free of charge. But there is scant evidence to indicate that the prospect of becoming an end-user is attracting, in droves, users who have proved in the past so resistant to traditional hard-copy services, or indeed, will change the loyalties of the few who

are already heavy users of existing manual systems. Inexplicable though it is to many information professionals the fact is that most people plainly do not want to be involved in the information-seeking process; it holds little interest for them and offers few rewards. In the words of P. W. Williams

> there will always be some who are never happy to turn over the search and others who would cheerfully accept almost any search themselves (Williams, 1977).

End-user searching is currently flourishing in fields where the rewards are perceived to be high and where users are already active information-seekers (and even here growth figures, starting as they do from such a low base, undoubtedly flatter). If there is to be a general increase (in end-user searching) it will most probably come on the back of general office automation where access to external databases is offered as an ancillary service.

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