Concurring session 1C

Videodisc and other media

Chair

A. Tschida Glassmeyer

The Medical Media Library - Room Facilities, Hardware Needs, Software Administration, Acceptance by Users

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The Medical Faculty of the University of Berne accepts some 160 students of human medicine, 40 dentistry students and 40 pharmacy students each year. Actually 1410 students are involved in their undergraduate curriculum in the three named disciplines. The number of the total teaching staff amounts to 285. In 1971 the Medical Faculty decided to reduce the amphitheater lecturing in order to increase significantly the small group teaching at the bedside and to individualize the curriculum by offering the students the self-instructional facilities of an audiovisual media library. In 1975 the Division for Instructional Media was founded and charged a) with the production of audiovisual learning materials for self instruction and b) with the institutionalization of a self-instructional media library.

Room Facilities

Presently this medical audiovisual library at the University Hospital Center has a ground surface of 700 m2 (35 m x 20 m). It is equiped with 14 learning carrels for tape slide shows (each carrel fit up for 4 students), 10 learning carrels for video cassettes, several cubicles for personal computers, for microscopy, for x-rays and each a working place for a laser-disc slide bank and for interactive video, 30 reading places, all this amounting to a total of 130 working places. But in this audiovisual learning center there are also a cardiopulmonal laboratory, a seminar room, a medical bookstore and a cafeteria. The central University Hospital Library is located in a neighbour building. It is hoped that its urgend need for more space will be met within the next two years. Unfortunately there is presently no direct room connection between the audiovisual learning center and the University Hospital Library. But there are plans to bring those two facilities together in the mid-nineties.

The print material library is attended mainly by the academic staff and by students. The library offers, besides its own holdings of 650 current journals, more than 42'000 volumes, bibliographic online searches, access to all other department library holdings of the Medical Faculty with another 700 current journals (through its union catalogues). The University Hospital Library carries out the interlibrary loan requests for the hospital staff and the document delivery service (photocopies of articles, in total about 45'000 requests per year); the later also for practicing physicians and for private and public libraries of the whole country.

The main visitors of the audiovisual media library are medical and nursing students and students of other health professions. It seems that the majority of the generation above 50 is not able to become intimate with the audiovisual self-instructional technologies.

Hardware Needs, Learning Programs

Much attention was afforded to create a good physical learning environment within the learning cubicles (as e.g. indirect, damped light to reduce reflection at the monitor screens, walls inlayed by a dark-red carpet, seat arms equipped with writing boards etc.). While the students usually prefer to read alone, they prefer to work on audiovisuals in groups of 2 to 3. It was therefore of importance to define the carrel size accordingly (ours have a ground surface of 5 m2 (2 m x 2.5 m). After several technical trials we can confirm the almost worldwide experience that for self- instructional tape-slide shows the Kodak carousel system is by far more suitable than projectors with straight and open slide holders (Leitz type). We would also like to warn all those who erraneously believe that the classical photographical slide will generally be replaced already in very near future by digitalized image systems. For video, the U-matic system has the eminent advantage that no cassettes are robbed as almost nobody has a U-matic machine at home. Each learning package is presented in an unbreakable plastic drawer big enough to complete - where necessary - the tape slide show or videocassette with paper comments in DIN A4 format. All learning packages are regularly supplemented with one-page questionnaires for the evaluation of the program by the users. At present about 1'000 audiovisual titles are offered, whereof about 10 % of own production. All learning programs in the media library are duplicates. The originals are stored in a fireproof room.

Accessibility

The media library is accessible 7 days a week 24 hours around the clock. Many users like to work in the late evening up to midnight or later, others come at 6 o'clock or even earlier in the morning. No library staff at all is present, as the disposal of the learning materials is in the full responsibility of their users, which amount to about 1000 persons. In case of technical troubles (which happens in average once a day), the user may call one of our two technicians, or - if not urgent - he may put a repair-note into the mail box which we check every morning.

As the clinical part of our undergraduate curriculum is decentralized, we were commissioned by the faculty to equip also a dozen affiliated peripheral teaching hospitals with audiovisual learning carrels (for tape slide shows and videocassettes). Each year our division provides these satellite hospitals with a set of new learning packages produced at the university hospital in order to warrant some "unité de doctrine".

How do the users find the suitable learning programs?

1. Each year we give them lists of recommended learning packages for the next curriculum phase.

2. By the help of the University Hospital Library the audiovisual programs have been MeSH-indexed. So the user may find audiovisual resources by checking the relevant pertinent subject headings. A copy of this subject catalogue is also integrated into the file cards of the print material resources in the hospital library. So the user may realize that in addition to the print

material he was looking for, there is also a videofilm or other audiovisual material about the same topic.

3. In addition to the MeSH-index we have also keyworded and cross-indexed the learning-programs according to the classical **teaching disciplines** and to **target groups**.

User acceptance

The evaluation of hundreds of questionnaires revelaed that the audiovisual self-instruction library is the **favourite learning setting for 96 % of the medical students** and it seems to be equally highly rated by many users of non-academic health professions. In 1987 the built-in time counters totalized for video and tape-slide show **22'000 running hours**. As usually 2 to 3 students join to work on the same program we can extrapolate that each student uses audio-visual learning packages during near 300 hours in his undergraduate curriculum (meaning 10 weeks with each 30 hours of intensive learning).

What projects and strategies shall we consider in the near future?

1. As already mentioned, it would be desirable to have **all information resour-ces** - print and non-print material - at the **same place**.

2. There is an urgent need for a **European catalogue of medical audiovisuals**. We file about 50 different catalogues of audiovisual resources in medicine. They fill a shelf of about 100 centimeters. To search for the existence of an audiovisual production about a specific topic takes hours! Therefore we have started to creat a user-oriented and computerized **media library cata-logue** - similar to the audiovisual catalogue of the American National Libra-ry of Medicine. Actually, due to the lack of staff, the project had to be interrupted, but we hope to continue with it in 1989. However, we have to admit that the **language barriers** are a severe problem. The majority of our users reject audiovisual programs in other than German language and analo-gous observations are reported from other language areas. So we have decided to restrict our project of an international audiovisuals catalogue to the German speaking countries.

3. The interinstitutional **exchange** as well as the intrainstitutional **copy-distribution** of audiovisual learning resources is more and more impeded by the tightened-up copyright **regulations**. We are to respect the rights of the program authors, particularly of those who earn their life with it. But for the many productions financed by public funds we all have to stand up for a fair liberality in giving and receiving.

4. Whatever we plan we have to consider that all planning happens to obey to the following 6 steps:

   1. Enthusiasm
   2. Embarassment
   3. Soberness
   4. Search for the guilties
   5. Punishment of the unguilties
   6. Reward of the non-participants

For: Planning is the replacement of contingency by error.

DISQUE OPTIQUE ET MICRO-INFORMATIQUE DANS LA FORMATION MEDICALE EN SUISSE

D.J. DE WECK; P.H. GYGAX; M.C. CLELAND

L'importance de l'imagerie médicale n'a cessé de croître au cours des dernières décennies avec l'avènement de nouvelles technologies. On peut ainsi obtenir des renseignements diagnostiques de plus en plus précis. Le volume de ces données et en particulier de l'iconographie pose des problèmes de stockage qui se répercutent dans la gestion des dossiers médicaux[1], dont les utilisations sont variées : suivi des patients, recherche, enseignement médical et paramédical, information des patients et du public.

A côté des nombreuses formes d'imprimé, on a de plus en plus recours aux films et supports magnétiques (bandes, cassettes, disquettes, disques, cartes, etc.) pour conserver les données médicales. L'accès à ces supports n'est pas toujours aisé ni rapide, les pertes ou erreurs de classement ne sont pas rares, les problèmes de conservation, enfin, font que les disques optiques vont sans doute bientôt s'imposer comme nouveaux supports ou mémoires de masse[9].

C'est pour se familiariser avec ce nouveau média et ses applications qu'une équipe composée en majorité de médecins, sous la direction du Professeur H.-P. Rohr de l'Université de Bâle, a réalisé en 1984 le premier vidéodisque interactif et institutionnel médical en Suisse. Cette réalisation a été baptisée CH-MED. Le vidéodisque contient, à côté de quelques séquences animées, 42'000 images fixes, provenant d'environ 200 collections publiques ou privées, et couvrant pratiquement tous les domaines des sciences biomédicales. C'est grâce au bénévolat de 42 collaborateurs et au soutien financier de l'industrie privée (une firme pharmaceutique suisse, une maison d'édition allemande et un fabricant de matériel néerlandais) que cet important travail a été mené à bien en un temps record (moins d'une année).

Dans sa conception, ce projet-pilote CH-MED n'a jamais été destiné à une exploitation commerciale. Il a été conçu et mis en oeuvre pour servir d'essai aux institutions médicales intéressées par cette expérience. Une des premières tentatives d'application de ce vidéodisque fut de le coupler à un ordinateur PC[3], dans le but de créer un vaste atlas

électronique interactif. Ceci nécessita la création d'un logiciel de recherche d'images par mots-clé[6]. Le deuxième essai important d'application fut de créer un système d'enseignement assisté par ordinateur donnant accès à des images photographiques couleurs, en plus des textes et graphiques disponibles jusque là. Un système auteur permettant aux enseignants de créer, sans connaissance préalable en informatique, un programme d'enseignement assisté par ordinateur (EAO)[7] ou une simulation de cas clinique (PMP = Patient Management Problem) a donc été réalisé. Ces travaux, non encore terminés, visent à mettre à disposition des intéressés une sorte de «livre électronique souple», doublé d'un instrument didactique de pointe. Actuellement, c'est le Fonds national suisse de la recherche scientifique qui finance les applications informatiques décrites. A relever encore que toute l'interaction de l'utilisateur avec le système s'opère au moyen de la souris électronique.

Les centres de moyens d'enseignement des Facultés de médecine à Lausanne et à Genève, après avoir participé à cette expérience dès ses débuts, ont récemment décidé de créer leurs propres programmes d'EAO au moyen de ce système, pour répondre aux besoins de leurs enseignants et étudiants. Il s'agit d'une évolution naturelle dans un pays comme la Suisse, marqué par le fédéralisme jusque dans ses universités, conditionné par la pluralité des langues et des cultures. Les ressources nécessaires aux prolongements d'un projet comme CH-MED étant importantes, la collaboration avec les auteurs bâlois restera aussi intense que possible pour éviter toute dispersion d'énergie. Le développement de la technologie du disque optique rend heureusement ce dernier plus accessible, notamment par la diminution des coûts du matériel et de la production[4].

La Suisse connaît certains obstacles au développement de projets nationaux. Le problème linguistique, déjà évoqué précédemment, a ainsi conduit les facultés de médecine de la Suisse francophone à se tourner en partie vers la France. Par exemple, l'Université Descartes de Paris V a produit quatre programmes d'EAO, intitulés EAO-V, utilisant le vidéodisque[12]. Ces programmes comportent des travaux pratiques, des études de cas en hématologie, rhumatologie et pneumologie. Ils ont été testés et sont maintenant diffusés sur une assez grande échelle (plus d'une vingtaine de centres universitaires français les ont acquis). Les Facultés de médecine de Lausanne et de Genève ont donc acheté ces programmes, si bien que les étudiants en médecine francophones de Suisse disposent désormais d'un outil remarquable, permettant l'apprentissage rigoureux de la démarche diagnostique et de la reconnaissance d'images (radiologiques, cytologiques, etc.), sans

parler de la maîtrise des examens paracliniques (enregistrements électro- ou phono-cardiographiques, par exemple).

A Lausanne, ces programmes d'EAO avec images fixes et dynamiques ont été bien accueillis par les étudiants en médecine et par les médecins, qui en ont surtout apprécié la qualité didactique et le caractère stimulant. La Bibliothèque et centre de documentation de la Faculté de médecine de Lausanne (BDFM) dispose pour l'instant d'une seule station de micro-ordinateur couplée à un lecteur de vidéodisque. Cette station est en libre accès. Deux autres stations identiques sont installées l'une au Centre d'enseignement médical et de communication audio-visuelle (CEMCAV) pour les développements d'autres didacticiels, l'autre à la Division de génétique médicale pour l'aide au diagnostic.

Le vidéodisque interactif présente, par rapport à la technologie vidéo classique, deux avantages importants :

- la grande rapidité (moins de deux secondes en général) avec laquelle on peut accéder visuellement à une image de son choix (accès aléatoire et séquentiel);

- l'excellente conservation des documents (durée nettement plus longue que pour les supports magnétiques).

La qualité de restitution des images est bonne, si l'on est parti, pour la gravure du disque, de films originaux de très bonne qualité et si l'on dispose également d'une bonne installation de lecture (le moniteur TV doit aussi être de bonne qualité et bien réglé). La perte est également modeste lorsqu'on tire ensuite des copies supplémentaires.

En conclusion, le vidéodisque que l'on peut consulter sur un mode conversationnel, à son rythme et librement[10], est certainement un instrument très prometteur, dans la mesure où il est techniquement fiable, simple d'utilisation, et qu'il permet de sortir l'étudiant de la passivité à laquelle le confinent souvent d'autres formes d'enseignement. Actuellement, la réalisation d'un vidéodisque demande d'importantes ressources en personnel : pour définir des objectifs clairs, pour choisir les documents et en coordonner la saisie, pour indexer et classer les images, pour exécuter les différentes tâches de transfert sur les bandes «master», pour fournir enfin le matériel de base au fabricant du disque[2]. Tout cela exige une collaboration étroite entre divers spécialistes et des moyens techniques et administratifs

importants. Pour un vidéodisque destiné à l'enseignement, la finalité pédagogique doit être claire[5]; le programme d'enseignement assisté par ordinateur devra être réalisé et contrôlé avant l'établissement du programme de réalisation du vidéodisque[6]. La qualité du logiciel d'exploitation du vidéodisque revêt à cet égard une importance capitale pour l'usage qui sera fait du produit final. L'auteur du programme d'EAO doit être dans la mesure du possible l'enseignant lui-même, à qui l'on doit donner le temps nécessaire pour la réalisation de son produit, ainsi qu'une formation lui permettant de le construire dans les règles. Il est important, à cet égard, que les Facultés de médecine reconnaissent l'intérêt de telles activités et les honorent en conséquence.

Il faudra aussi que les enseignants désireux de réaliser des didactitiels avec vidéodisques puissent bénéficier d'un soutien technique efficace (centre de moyens audio-visuels et informatiques) et qu'ils puissent être certains que leurs étudiants pourront utiliser leur didactitiel dans des conditions favorables (médiathèques à disposition).

Comme on le voit, les nouvelles technologies éducatives permettent ou imposent des changements qui peuvent être lourds de conséquences dans la manière d'enseigner ou d'apprendre. La vraie question est de savoir si elles permettront un réel progrès pédagogique[11]. Les prochaines générations seront seules en mesure de répondre à cette question.

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Concurring session 1D

Use of databases

Chair

A. Dracos

ON-LINE INFORMATION SYSTEMS
IN THE FIELD OF BIOMEDICAL SCIENCES
OF SERBIA

DR MILUTIN DAČIĆ and DR GORAN KECMAN

The Central Medical Library of the Faculty of Medicine in Belgrade is the coordinator of the activity in the System of Biomedical Science Informations of Serbia (S B M N I) within the System of Biomedical Science Informations of Yugoslavia. This activity, which is very important for the future of biomedical science and practice, was assigned to the Faculty of Medicine, particularly to the Central Medical Library at the beginning of 1985 by the Science Foundation of Serbia.

Members of the system are all the republics and provinces (eight in all) which comprise a unified, decentralized system of Biomedical Science Informations of Yugoslavia (S B M N I S F R J). (FIG. 1.)

The main goal of S B M N I of Yugoslavia is to secure fast and efficient transfer of quality scientific and expert informations for all users in the country as well as to present Yugoslav achievements in the field of biomedical sciences to the world scientific community. Compared to the goals of the federal system, the basic duties of the republic and provincial coordinators are the gathering, storage and indexing of documents about published scientific and professional works by authors from their region, published either in the country or abroad.

As the result of this activity a database of biomedical scientific information in Yugoslavia was formed (the host is in Maribor). A printed version of the database is published as a seconcary publication, "Biomedicina Iugoslavica: Index

Medicus Iugoslavicus (BI)". Biomedicina Iugoslavica appears
every three months and represents the scientific and professional
production of Yugoslav authors from the field of biomedicine.

In addition to the bibliographic database BI, a database
"A Catalog of Foreign Biomedical Periodicals in Yugoslav
Libraries" was created. This catalog is updated annually for
the following year and is available in printed form.

During the formation of our domestic databases, the work of
foreign databases in the field of biomedicine was studied. To
that purpose we, the Central Medical Library of the Medical
Faculty in Belgrade, have signed an agreement with the host
D I M D I in Koln for direct ON-LINE use of scientific infor-
mations. D I M D I (Deutches Institut fur Mediziniche Doku-
mentation und Information) offers access to fifty biomedical
databases of significance to Europe, specializing in biomedical
science informations. D I M D I is also a referal center of the
World Health Organization.

The Central Medical Library of the Medical Library in Belgrade
has in the passed period trained its staff in the use and search
of foreign and domestic databases. Modern equipment along with
accessories has been aquired for efficient search of the newest
scientific and professional documents in the field of biomedicne.
Accordingly a search form has also been created.

BIOMEDICAL SCIENCE INFORMATIONS DATA BASES

When we speak of databases or biomedical science and pro-
fessional databases, we must differentiate between: 1. Producers
of biomedical science informations, and 2. Owners of biomedical
science informations bases (hosts).

1. Produsers of biomedical informations are scientific re-
search institutions and other health organizations, which
through their scientific and professional potentials, through
man the creator of "knowledge about something", produce each in
his own field information for himself as well as for others.
Such institutions besides creating information (acquiring,
managing and indexing them) make them available to other users,
either through exchange or for sale.

2. Differing from the first are hosts (servers), institutions
hich buy finished, formed bases of science informations storing
hem on their computers to be sold to users on demand. Such in-
titutions (hosts) must be equiped with modern computers of great
emory capacity, so that a large number of databases and infor-
ations could readily be accessed and searched.
 Here we must mention the largest European biomedical host
 I M D I in Koln.

D I M D I

Deutsches Institut für Medizinische Dokumentation und Information)

 D I M D I was founded in 1969 and is affiliated with the
ederal Ministry for Youth, Family and Health affairs of the
ederal Republic of Germany. The main obligations of D I M D I
re to gather, sort and store information about national and
nternational literature as well as other information from the
ield of medicine and related areas, and to perform retrospective
nd current ON-LINE searches.
 Currently about fifty databases are available for ON-LINE
earches from all areas of the biosciences such as medicine,
ealth, pharmacology, toxicology, psychology, social medicine,
iology, food and agriculture. To assure efficiency D I M D I
ooperates with many institutions.

CONCLUSION

 We believe that we have created two of the basic conditions
technical and manpower) for the solid functioning of the ON-LINE
ystem of Serbia. The upcomming period will be marked by creating
users' culture" among scientists, mostly through seminars. Com-
letion of this goal will ensure the optimal functioning of the
N-LINE information system in the field of biomedicine of Serbia.

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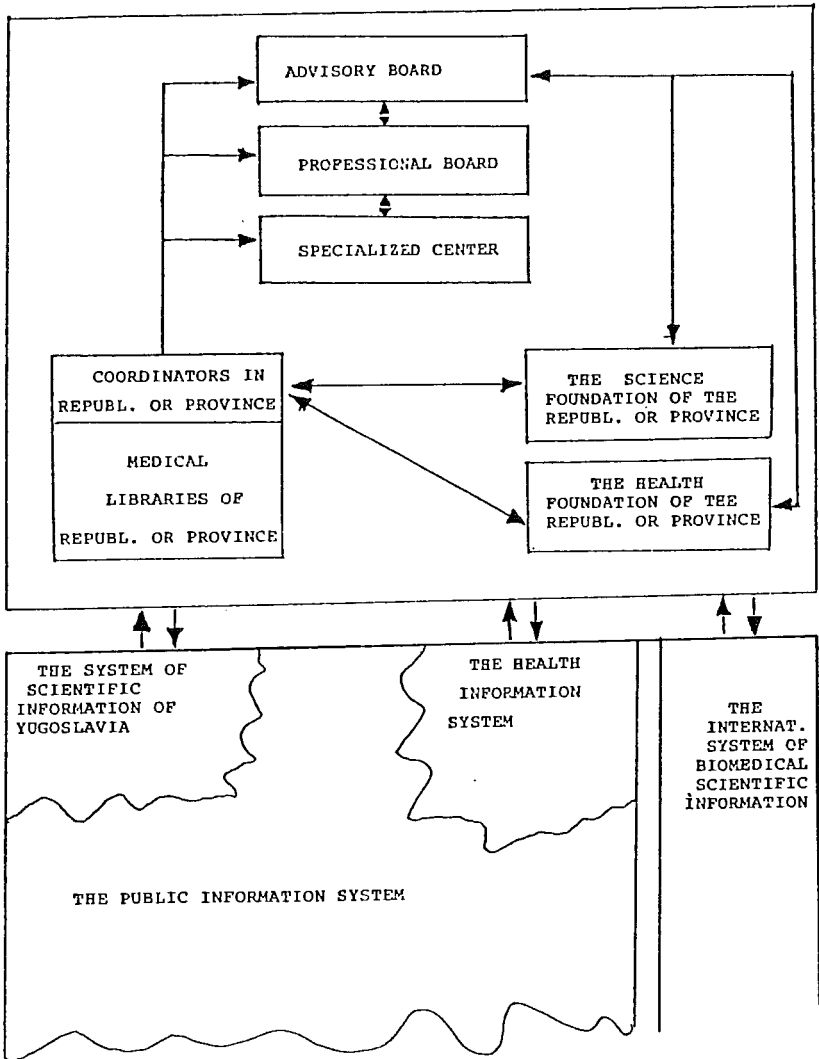   Computers., The University in Niš, Niš, 1983.

FIG. 1. THE ORGANIZATION OF S B M N I OF S F R J

1. FIELD
   -Biomedicine

2. USERS
   -Medical faculties in Serbia
   -Health organizations in Serbia
   -Scientific institutions in Serbia

3. TECHNICAL RESOURCES
   -Microcomputer system configuration DPS 6/20 Ei-Honeywell
   -Three asynchronous terminals VIP 7251 Ei-Honeywell
   -Printer (200 signs/sec, 132 columns) Ei-Honeywell
   -PC Ei-Honeywell, type XP
   -Modem ISKRA DATA
   -Printer (80 signs/sec, 80 columns) Ei-Honeywell

4. MANPOWER
   -Two physicians
   -One biologist
   -One mathematician-informatics expert
   -One phylologist-anglist

5. DEPENDENCE ON OTHER PROJECTS
   Activities related to ON-LINE services of foreign databases
rely on activities of the specialized center for biomedicine
of Serbia which is financed by:
   -The Science Foundation of Serbia
   -The faculties
   -The Education Foundation of Serbia

   FIG. 2. TECHNICAL AND MANPOWER CHARACTERISTICS

THE IMPACT OF UNLIMITED ONLINE ACCESS TO MEDICAL LITERATURE ON THE
STANFORD MEDICAL COMMUNITY

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Lane Library supports the research, education, and patient care activities of
Stanford University Medical Center. The Center consists of one of the leading
medical schools of the United States. a clinic, and a tertiary care teaching
hospital of 700 beds. The Library has a collection of over 300,000 volumes,
subscribes to 3,000 biomedical serials, has a staff of 40 full time personnel,
and operates on an annual budget of $2.4 million. The Library's services
include traditional reference, literature searching, audio-visual programs
(operated through a specialized branch), and a 25-workstation networked micro-
computer cluster, used as an electronic classroom and self service laboratory.
The Library is also engaged in the phased installation of an integrated li-
brary automation system, started about two years ago, has a network communica-
tion-based interlibrary loan service (including facsimile), offers local
access to several versions of the Medline database on CD-ROM, and offers a
bibliographic file-management and electronic access consulting service to
Medical Center personnel. In other words, the Library attempts to keep up with
current technology.
More significant in my view, however, than any of these services and programs,
is the Library's "Lane-Medline" service, offered in cooperation with BRS
Information Technologies, a leading provider of access to bibliographic data-
bases.
Some years ago, in the context of a self review and long range plan, and in
response to the now overwhelming quantity of current, topical medical informa-
tion that researchers, educators, and practitioners must command, Lane Li-
brary defined for itself the mission of transforming from a repository of
published material into a proactive information service. In practical terms,
this means that the Library is dedicated to bringing information to its users
when and where they need it. All of the Library's modern technology based
services are designed to get us closer to this goal.
The 1981 article in the *New England Journal of Medicine* on the
Paperchase program of Beth Israel Hospital aroused interest in academic cir-
cles, and created a modest demand for end-user searching services. In re-
sponse, in late 1982, Lane Library launched an aggresive instructional pro-
gram, teaching end-users to search Medline using Dialog's, and then a year
later, NLM's command-driven interactive language, and it became the first
resource library whose search training program was approved by NLM. About
another two years later, major vendors of database access began introducing
user-friendly, interactive languages, designed to make end-user searching

easier. Gradually vendors started adding a selection of full text journals to their databases. In response to this, Lane has been adding courses on the various interactive search languages to its instruction program: BRS Colleague, Medis, Paperchase. A modest number of faculty, residents, and post-doctoral fellows at the Medical Center signed up as subscribers to Dialog, BRS Colleague and as "Grateful Med" users.

With end-user searching becoming popular, some of the leading medical school libraries showed interest in purchasing Medline data from NLM, and providing access to it through their local automation systems. At Lane we were also actively looking for an effective way to bring literature service to a broad spectrum of our users. We did not chose this approach because (1) only a subset of the Medline database is affordable to store locally - on the average, about two years' worth of data - and (2) storage and software maintenance costs are considerable. Other libraries meanwhile experimented with Medline on CD-ROM, a new format, running on microcomputer peripheral equipment and thus relatively inexpensive. We acquired the technology at Lane on an experimental basis, but since it is so far accessible to only one user at a time, we decided it was not an adequate basis for a service for a large community of users.

Our goal at Lane Library is to make online literature searching so easy, convenient, and responsive, that researchers, clinicians, and teachers turn to it spontaneously when they have a question, the same way they might reach for the telephone, to ask a colleague. Ultimately, we hope that sufficiently easy access to literature may result in a behavior change on the part of medical practitioners, in that they will use published information more frequently and more promptly than formerly. This in turn, we hope, will ultimately contribute to improving the quality of medical care. We believe that this potential exists and may be achievable if we remove whatever obstacles are in the way.

We identified five types of obstacles which can prevent literature searching becoming a way of life: (1) Cost; (2) Required equipment; (3) Inconvenience of access; (4) Required new skill; (5) Lack of visible mentors practising the new skill. We set out to remove as many of these obstacles in the way of the Stanford Medical Center community as we could.

To take the last one first, we have already made considerable headway. In 1982 December we launched our teaching program of literature searching in partnership with Medical School faculty, recognizing that high visibility faculty peers, who carry the torch, are a required part of the formula for success. Library staff and a small core of experienced faculty taught searching teaching as a team, until librarians achieved a workable level of visibility and credibility.

The Cost barrier: In May of 1987 we approached BRS Information Technologies and proposed that they experimentally provide us prepaid, flat-rate access to Medline, Cancerline, and their full text journals via their Colleague program. BRS agreed, and offered us 1,000 passwords and included Previews, and a special AIDS database, in addition to the above, for a one year period. We signed a contract. The arrangement would remove, or at least significantly diminish all aspects of the cost barrier: the per capita cost of the contract was

reasonable and affordable; the volume of searching would not increase the cost, and thus would not create a negative incentive to frequent or intensive searching; and the flat-rate, one-year contract was budgetable, and thus central funding could be practical.

The barriers of equipment required and inconvenient access are related to some extent. There is a very large installed base of computer terminals and micro-computers at Stanford, and many in the community have their own equipment at home as well. Communicating devices fall into two categories: those with individual modems and telephone line access, and those connected to the Stanford University Ethernet network (SUNet). "Traditional" online searching in libraries relies in modems and telephone. Accordingly, BRS makes Colleague accessible over the commercial networks (Tymnet, Telenet,etc) and markets directly to individual physicians. These individuals, in turn have a large variety of communicating hardware and software they are accustomed to using, and the prospect of coordinating consulting help and assistance for all this in the context of a centralized service did not seem practical. In addition, relying exclusively on modems would have left the very large number of Medical Center terminals with existing network connections without a means to reach the BRS/LANE-Medline service. Using the commercial networks, of course, also adds to the cost of searching, providing another reason to find another way.

We therefore decided to make the service available on SUNet. By providing dial-up access to the network for modem users, and installing a gateway which connects to BRS Colleague, we succeeded in accomodating both network users and modem users, via a uniform, simple login protocol for all (Figure 1).

(Incidentally, this solution, so simple to state, was quite complicated and technically challenging, however, the specifics of the technical solution are beyond the scope of this paper.)

To overcome the skill barrier, Lane staff, using teaching aids from BRS, and their own creativity, designed a series of one and two-hour seminars, and launched a very aggressive campaign to train a maximum number of users in minimum time. Close to 700 users were cycled through sessions appropriate to their experience in literature searching within about the first six months. Given the foregoing, we feel that we have made significant progress in removing (or al least diminishing) the barriers in the way of online searching. If so, online searching could potentially become a primary method, or one of the first choices, in getting information required in the context of medical research, instruction, and patient care. We conducted a survey attempting to assess the impact, or potential impact of the Lane-Medline service.

The Lane-Medline/BRS Colleague service started on March 1, 1988. Because of time pressures, we changed the methodology of the survey which we suggested at the time the abstract for this paper was submitted. We sent questionnaires to all registered users, during the month of August, after five months of service. We sent out 620 survey instruments. By the beginning of September we received 181 returns, a 30% response. (By the end of September 231 questionnaires were received, a 37% return, but because of lateness, the last 50 could not be included in the data analysis.) In the survey we ask users about their

experience in online searching prior to Lane-Medline, equipment thay have
access to and the convenience of access, then we ask details about the criti-
cal incident of the most recent search they ran, and finally we ask about
their sense of value of the service. This is the summary of responses:

Prior to Lane-Medline, 83 respondents had done manual searching only, or had
their computer searching done by librarians, in other words, slightly less
than half (46% of the total) had no direct online experience. Among those with
online experience, BRS is the most commonly chosen service, followed by Grate-
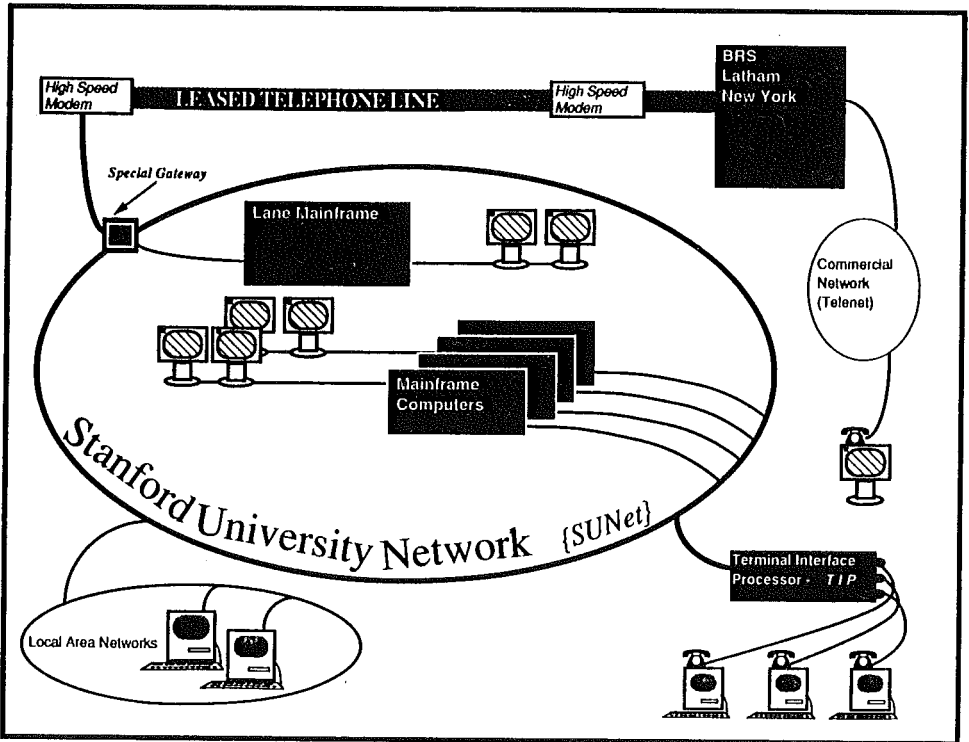ful Med, then Dialog.

Figure 1

IBM type equipment is more widely available than Macintosh (a ratio of 3:2). Because of both kinds of equipment available to some users, it is impossible to say exactly how many have equipment immediately at hand. However, it is clear, that the vast majority of searches was performed by those who have equipment close by:

One hundred sixty respondents, 88%, search from twice per week to once a month. More than half (93) have equipment immediately available in their office or home, i.e. less than 30 seconds away. Compare this with those who have to step next door (30 seconds away)- only 17 searches, or 11%. It is very clear that immediately accessible equipment is required for searching to occur frequently and freely. From this we can extrapolate that time is of the essence. Therefore, a quick, simple, and reliant logon method is also essential, since without it an excessive price (in time) would have to be paid. By putting the service on SUNet, we made it accessible to a significantly larger community who have network terminals at their workplace, and who otherwise would have to walk to appropriate equipment. Similarly, by providing a simple and unified login procedure to all users, we shortened access time and promoted use. Convenient access to equipment also influences whether searching is deliberately planned or spontaneous. Many more searches, overall, are done where the equipment is conveniently near, confirming that lack of immediate access is a major barrier to searching. The proportion of spontaneous searching drops significantly when the equipment is 3 minutes away or furthur.

Our data confirm that at a research oriented medical center , like Stanford, the overwhelming interest of the community is research-127 (or 70%) of 181 searches were performed in the context of research. Research is the principal interest of both the basic, and the clinical science departments. It is interesting to note that all searches performed in the context of instruction were done by faculty in the clinical departments - suggesting that clinical teaching rests more on current, topical material than does basic science teaching. It is also significant that a quarter of all searches were performed in the context of direct patient care. One hundred seventy-two (or 95%) judged their searches wholly or partially successful. Among the 40 partially successful searches (the results were considered good, but the search was continued furthur by other means) 13 were in basic sciences and 27 in clinical sciences. This distribution corresponds to the overall distribution. Contrary to expectation, researchers seem to accept abstracts (without following up the full article) more readily than do those in patient care.

While the flat rate cost of the BRS contract makes it possible to centrally budget for the service, at Stanford (at least to date) central funding has not been approved, except for medical and graduate students. Instead, Lane Library charges individual annual subscription fees to users of the service, which then allows unlimited access. Depending on individual circumstances, 36 users (20%) used their own, personal funds to pay for the subscription, 107 (60%) could use their departmental budget or grant funds, and 34 (20%) medical students were funded through the Library's budget. It is interesting to note that the source of funds seems not to significantly influence the perceived

value of the service.

Eighty-three respondents had their searching done by others prior to Lane-Medline, 46% of the total. Of these 31, or 37%, consider the service more valuable than its price, suggesting perhaps that those with prior experience appreciate the service more, or that it takes time and experience to fully realize the value of the service. Among the same 83 respondents, 34 (41%) had highly favorable comments on the service.

Of 181 respondents, 153 or 84.5% increased their frequency of doing literature searches with the advent of Lane-Medline. The distribution of those who increased their searching appears to be the same, regardless of actual, absolute frequency of their searching. One hundred seventy-two out of a total 181 (95%) expect to search the literature more frequently than before, since the introduction of Lane-Medline.

Almost exactly half of the respondents (90) wrote general comments on the questionnaire. Of these, 75 (83%) were simply positive, generally expressing thanks for the service and a testimonial to its usefulness, and an additional 10 (11%) combined expressing positive comments with the expression of wishes (e.g. would like access to additional data bases).

Total Database Use

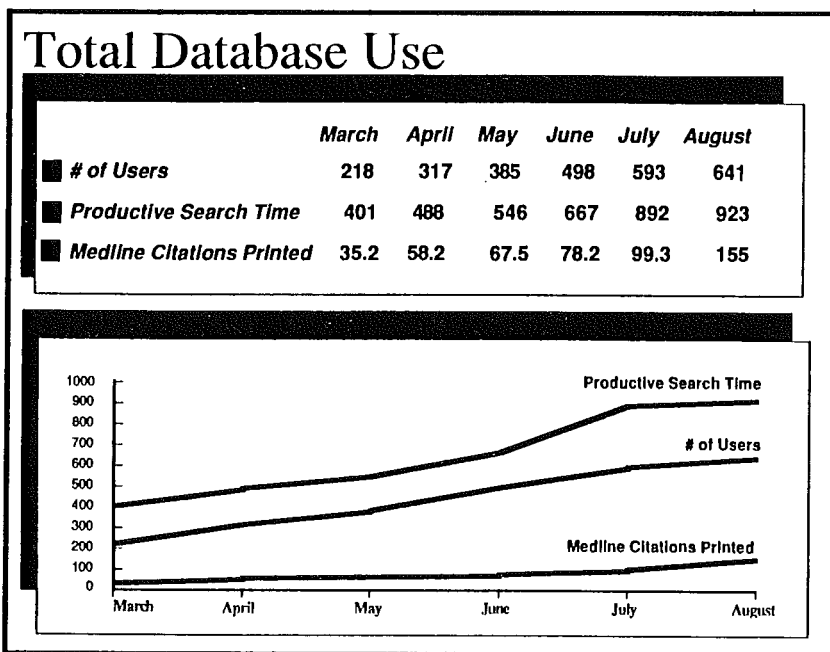|	March	April	May	June	July	August
# of Users	218	317	385	498	593	641
Productive Search Time	401	488	546	667	892	923
Medline Citations Printed	35.2	58.2	67.5	78.2	99.3	155

Figure 2

In addition to our survey data, data provided us by BRS on the patterns of access by our users is also useful in assessing the value of the service. Figure 2 shows, for each of the first 6 months of the service, the growth of our searching population, the increase in total connect hours (excluding logging in and out, menu selections, and help screens), and the increase in the number of citations printed, or displayed in print format.

Growth Rates & Normalized Growth Rates of Productive Search Time & Citations Printed

	March	April	May	June	July	August
Users: Growth Rate	1	1.45	1.77	2.28	2.72	2.94
Search Time: Growth Rate	1	1.22	1.36	1.66	2.22	2.30
Search Time: Growth Rate Normalized	1	0.84	0.77	0.73	0.82	0.78
Citations Printed: Growth Rate	1	1.65	1.92	2.22	2.82	4.40
Citations Printed: Growth Rate Normalized	1	1.14	1.08	0.97	1.04	1.50

Citations Printed: Growth Rate

Users: Growth Rate

Search Time: Growth Rate

Citations Printed: Growth Rate Normalized

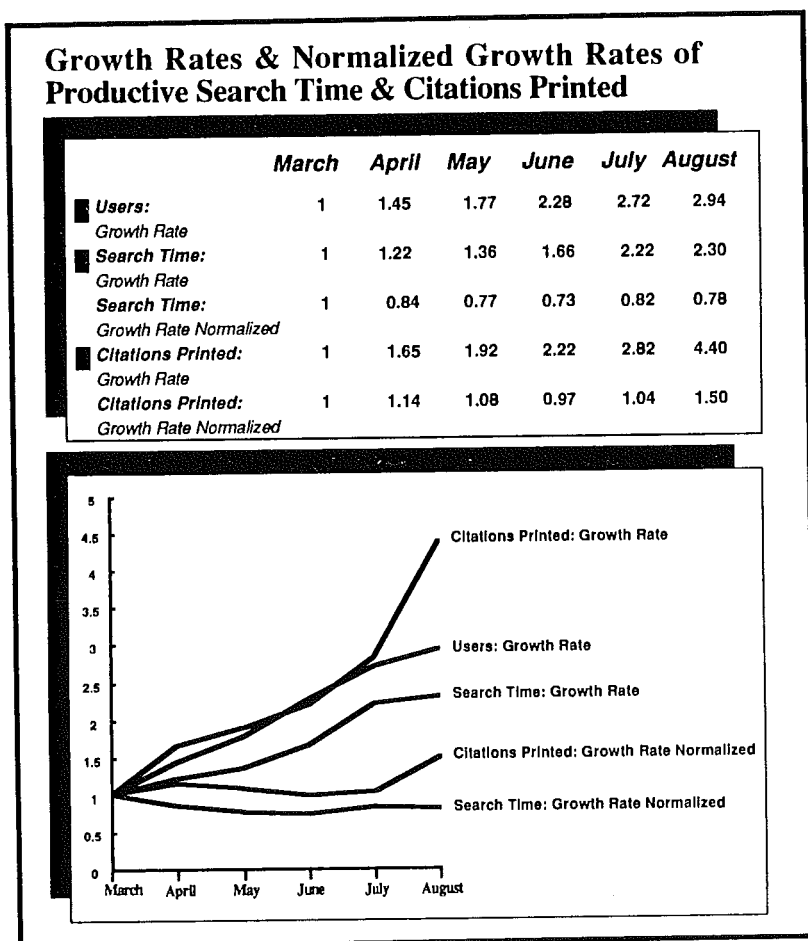Search Time: Growth Rate Normalized

Figure 3

Figure 3 shows essentially the same information in different form. The table on top shows the growth rate of the user population, the absolute and normalized growth rate of connect hours, and the absolute and normalized growth rate of printed citations. By normalized growth rate we mean a rate adjusted so it corrects for the underlying growth of population.

Underneath the table the same information is shown in graphic form. One line represents population growth. A pair of lines show total search time: The normalized, lower curve indicates that search or connect time actually decreased slightly as the progam got under way. However, as the citation line pair indicates, citations printed increase significantly (by a factor of 1.5), even when normalized for population growth. This suggests that as users gain experience, they are able to produce retrievals in less time, but they continue spending sufficient time to increase their useful output.

Regrettably, the studies performed to date fall short of providing a reliable, quantitative measure of the impact of literature searching on research and patient care. The data does suggest that a positive correlation exists. In the future we hope to follow up the present, modest studies with furthur work, attempting to show the precise nature of such a correlation.