

### Reading, Knowledge and Information in an IT Environment: a University Library Perspective\*

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**ABSTRAK:** Terdapat banyak aspek dan konsep mengenai pembacaan. Di dalam sebuah perpustakaan akademik, pembacaan dihubungkan kepada pengajaran, pembelajaran dan penyelidikan. Ia dihubungkan dengan perolehan maklumat dan pengetahuan, dan bagi menjanakan pendapat-pendapat baru. Persediaan bahan-bahan dan perkhidmatan-perkhidmatan oleh perpustakaan hendaklah menunaikan keperluan pembacaan para pelajar, kakitangan dan sarjana.

Pengkomputeran dan teknologi-teknologi baru telah meneroka kemungkinan-kemungkinan yang baru untuk menyempurnakan permintaan-permintaan seperti ini. Teknologi Maklumat atau IT telah membuka kemungkinan-kemungkinan untuk suasana maklumat yang sentiasa kemaskini dan sejagat sifatnya.

Walau bagaimanapun bukan selalunya yang kita dapat beroleh manfaat daripada IT. Masalah termasuknya seperti kekurangan dalam infrastruktur, kepakaran kakitangan dan peruntukan kewangan, dan persepsi yang salah. Yang lebih rumit ialah masalah-masalah tidak diduga yang biasanya dikaitkan dengan perubahan. Bagi mengatasi masalah-masalah ini di dalam suatu rangka masa hadapan seperti Wawasan 2020, kita perlu menghadapinya dengan tenaga yang tidak kenal penat, imaginasi dan keiktisasan yang berpengetahuan.

**ABSTRACT:** There are many aspects to and concepts of reading. In an academic library, reading is linked to teaching, learning and research. It is associated with the obtaining of information and knowledge, and for the generation of new ideas. Library provision of materials and services should match the reading needs of students, staff and scholars. Multi-lingual, multi-script and multi-format informational materials, over wide spatial areas and from all chronological periods must be comprehensively and speedily made available. Such demands are normally beyond the local collection ability of any single library.

Computerization and the new information technologies have opened up new possibilities for meeting these needs. IT has opened up possibilities for a completely updated informational environment on a global basis.

It is not always possible to realize all the possibilities that IT offers. Current problems are related to such features as inadequacies of communications infrastructures, personnel expertise and funding, and wrong perception. More difficult to solve will be unforeseeable problems that are naturally associated with change. For these problems to be solved within the futuristic concept of Wawasan 2020 they must be tackled with tenacity, imagination and informed professionalism.

#### I. INTRODUCTION

'Perspectives' often appear to be both subjective and contrived; their only advantage (to the author particularly) being that when the time comes around for such perspectives to be examined more closely, the author is no longer there. Yet, such is the nature of speculation, and one must take comfort that should

the bases be at all sound, even postulations may still be a little useful as general indications for action.

Within the concerns of this Seminar, this paper attempts, albeit perhaps somewhat clumsily, to present certain basic processes and relationships that are fundamental to an academic library's operation. Provision of informational and instructional materials

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and technical processing of library stocks are discussed in relation to demands upon the library system and possibilities available within a computerized environment. Deriving from this analysis, it tries to postulate in what manner such a library would have to react in order to accept the challenges of using new technology in meeting old needs.

The author must disclaim any pretensions to having the training and expertise of the educationist, or sociologist or computer scientist. While the dictates of the paper made it imperative to pay attention to certain issues in computerization, education, sociology and mass communications, it must be stressed from the outset that this presentation is more in the nature of reasoned generalizations, rather than being a technical, expert exercise, with a heavy dependency upon the literatures for expert opinions. I alone am responsible for any misinterpretation or deficiencies.

Against this disclaimer, the five main sections of this paper are set out as follows after the Introduction:

- II. The activity of 'reading' within a university library is described as a cognitive process.
- III. Reader-clientele profiles are presented as elaboration of reading needs that must be met by university library provision.
- IV. Computing, and IT (or the computer and communications) technologies, have opened up new possibilities for libraries to meet these needs. A brief description of such possibilities is given.
- V. In the light of reading activity in a university, and technological advances, library response to meeting 'reading' needs is examined in terms of certain key library processes. Examples highlighted are: acquisition, processing and circulation of materials; collection-building; and reference services.
- VI. Some problems and issues that may be encountered are postulated.

The present is the threshold of the future. The above topics are thus analyzed as themselves being processes of change, with immediate future demands being hard on the heels of the present planning and provision.

## II. READING WITHIN A UNIVERSITY

### The Nature of Reading

At first glance, reading seems to be an activity which is simple to describe. Anyone enunciating the words (quietly to himself, or aloud to others) from a surface upon which words are written, or from a document,

such as a book, reads. Yet it is clear that there must be a difference from the four-year old triumphantly managing Theole Sieg's **Ten Apples up on Top** and the erudite professor re-reading Einstein's Theory of Relativity or the philosophy of Wittgenstein. The complexities inherent in reading are indicated by the uses to which the word has been ascribed. Some examples are as follows:

- The gipsy read his palm (or fortune, the tarot cards, or tea leaves);
- The sailor piloted the boat by reading the compass (or the stars, or the winds);
- He read the situation (or the silence, somebody's thoughts, or between the lines); etc.

The list is endless.

Similarly vast and variegated are the types of materials, besides books and journals, that are 'read'. Such materials carry characters other than the written word. For example, different types of experts 'read':

- Morse code, ciphers, and other signals and symbols;
- maps, charts and other diagrammatic representations;
- statistical runs and series, tables and other numerical sequences;
- standards, patents, music scores, and so on.

The metaphorical and descriptive uses of the word 'to read' as indicated above are reflective of different aspects of reading and the different levels at which reading may be conducted.

Gray, quoting various sources, indicates that there are at least three concepts of reading:

- (a) '... primarily a process of perceiving or recognizing written or printed symbols';
- (b) '... fluent, accurate recognition of words [and] also the fusion of the specific meanings represented into a chain of related ideas';
- (c) '... the reader not only apprehends the author's meaning but also reflects on the significance of the ideas presented, evaluates them critically, and makes application of them in the solution of problems' (Gray, pp. 17-18).

These three concepts of 'reading' therefore range from the

- (a) basic act of reading individual words and sentences; to the broader concept of
- (b) reading and understanding; to the still broader aspect of
- (c) reading, understanding, thinking and application of ideas and to produce new ones.

## Reading and the University Library

There is no clear consensus as to what the exact definition of 'reading' should be. As Clay has observed: 'Any statement that we like to make about reading is likely to be wrong in some aspect' (Clay, p.6).

The University Library need not bother itself as to which definition is pedagogically acceptable. It is certain, however, that much of the reading that takes place within its walls is likely to conform at least to the level of (b) above. In other words, Clay's definition of reading will apply:

I define reading as a message-gaining, problem-solving activity, which increases in power and flexibility the more it is practised. My definition states that within the directional constraints of the printer's code, language and visual perception responses are purposefully directed in some integrated way to the problem of extracting meaning from cues in a text, in sequence, to yield a meaningful communication, conveying the author's specific message (Clay, p.6).

**Research.** Any concept of reading in a university must take cognizance of the research process. Unlike reading for leisure, where a book is 'consumed' as an end product, reading for research is an intermediate process. Information and the knowledge held by others and elsewhere are 'consumed' by the researcher in order to allow him to come up with new findings which will in turn be used by others. The elements of speed and comprehensiveness in the supply of relevant materials read are relatively much more important than in situations where books are read for pleasure.

The place of research in a university makes it certain that all aspects of reading, from the more basic to the broadest, highest or deepest level will take place within a university library.

### Promotion of 'Reading'

In promoting 'reading' at a university library, all the above factors must be borne in mind. The collections must be of a variety and depth that is likely to be able to accommodate a wide range of information needs by different types of user-readers. Subsequently, additional, new output is likely to be generated from ideas which came to the mind during 'reading'. In other words, while it is likely that the stocks of a university library are large enough to accommodate reading for recreation and undiluted enjoyment, the university librarian has to focus on the prime role and concern of reading as a cognitive and creative process within the university. To this end, efforts at collection-building, materials processing, and services are targeted.

It is not possible to promote anything without knowing the clientele 'market'. Thus, as with all other types of libraries, an understanding of the clientele is important; together with their specific needs from the system. A better understanding will allow the library to effect better services in a more directed manner. The next section attempts to elaborate this.

## III. READING NEEDS OF THE ACADEMIC READER-CLIENTELE

Unlike the school and the public library (or its junior section), university libraries enjoy the advantage of being able to assume that their users not only **can** read, but also actually **wish** to continue to do so. In other words, 'reading' is much more an integral part of the academic library, quite unlike other arena of reading, such as the wider society, the home, or even other types of libraries, whose readership may decline for want of ability or interest. Consequently the 'how' of reading is less important than determining the 'what' and 'why' of reading needs. This concern is naturally linked to 'who' the readers are. In addition, to bear in mind always, that by 'reading' one means the obtaining of knowledge within disciplines and information on specific topics of interest, with the ideal consequence of generating additional new written output or fresh ideas.

### 1. The Readers

The community consists of students from basic degree courses to the more academically experienced postgraduate students. The teaching community also consists of junior lecturers to those with more scholarly experience such as professors. In addition, university libraries generally entertain researchers and scholars from outside their university whose reading needs would represent a wide range of interest from the most abstract to the most technical.

### 2. The Needs

Between them, the clientele is likely to demand from the most basic of tertiary instructional texts to the most exotic and esoteric of research materials. Reading is bound up with courses in all the disciplines of knowledge offered by the university. Needs are also linked to all the minute topics of research interest of individual research students, staff and scholars.

The bigger the university, the more the courses offered (in range and number) and the better organized the university is as a research institution, the more different and diverse will be the demands/needs that the library will have to meet.

While teaching needs may be satisfied with a well-stocked library of written texts, journal and related book material, the needs of research are necessarily wide-ranging. These needs are unlikely to be satisfied with any degree of comprehensiveness, by the stocks in any single library, no matter how large its stocks. A recourse must be made to materials and information held elsewhere (in other libraries, or specialized information agencies). For libraries in the Third World, this means resorting to information holdings abroad.

### 3. The Materials

**By field:** In times past, a university library, as at Pisa or Nalanda, needed only to stock the religious materials needed by its theological students. Today's secular universities (and their libraries) must cope with the whole of knowledge which has expanded most significantly. A general university library today must include all disciplines within the current spectrum of knowledge, in the arts and humanities; the medical and hard sciences; technology and the applied sciences; the social sciences and law, and the fine arts.

**By format:** In order to meet at least most of readership needs, the collection must encompass, in print, photocopy, microform or electronic format, some of the following: manuscripts, early printed books, contemporary books and journals; pictorial material (photographs, prints etc); audiovisual material (records, phonodiscs, video cassettes, films, etc); unpublished material (private letters, files, etc); ephemera (newspaper clippings; souvenir programmes etc); and other specialized materials related to specific disciplines (music scores; standards, patents; cartographic materials, etc).

**By information:** With such varied interests, information queries/demands come in many formats. They could be limited to just one single, small query - such as demand for one bibliographic citation, or knowledge of the meaning of one word. On the other hand, voluminous materials over wide chronological periods and spatial areas may be needed.

**By language and script:** With an international readership, as well as a local research readership who must be able to cope with a few languages in order to pursue research, it is likely that many general university libraries will have multilingual, multiscript collections. However, it may seek to restrict its main collections to perhaps half a dozen languages/scripts or so, in line with general readership language expertise.

### 4. The 'When' of Reading

There is one aspect of reading needs that a university library faces which is not faced by other library facilities. This is the time of day (and night) when the library must try to satisfy the reading needs of the clientele; and the speed with which information must often be supplied.

Students in the medical, dental, science and engineering faculties usually have very full working days. Usually they have to be at hospitals, laboratories, or workshops during the better part of the day. By the time they are rested and are ready to turn to the library, the day is well advanced, and library hours available to them (and their mentors) are limited. The library, therefore, has to remain as 'open' as possible, for as long as possible, to meet their special needs.

The daily teaching work of many professional readers are invariably closely linked with the practice of their profession. Thus doctors teach and practice medicine; the law faculty teach and consult in the law. For these professions and fields of knowledge, it is particularly important that information: diagnosis and cures; cases and judgments, etc., be obtained speedily, even immediately, as this literally saves lives. To a greater or lesser degree, speed is of the essence in all information work. Even for those in the arts and social sciences the need for speed is inevitable - as pressures of teaching and research, the writing-up of papers and theses, etc. make it imperative that information is obtainable quickly and comprehensively.

### 5. Special Problems in Reading

In real life, exceptions to the general rule may be expected to arise; some of these may cause problems, or at least constitute special areas of concern. For example, a university library faces problems when the general assumption of reading ability does not hold, or does not hold well enough.

It will also need to make special provisions should the blind and the sighted be integrated into the student body or the teaching corps. Such problems and concerns need be identified as and when they crop up, and need to be addressed, in order that 'reading' is carried out as effectively as possible by the total community.

### Factors for Change

In the same way that ancient libraries have changed to the modern library in order to accommodate new needs, so libraries of today must expect to change to cope with needs of the future. There are many propelling factors of change. Among these factors few are as compelling and dramatic as the computer and communications technologies which are now

available to libraries. These technologies have revolutionized the methodology for information processing and retrieval. They have proved a boon in aiding 'reading', as it is conducted within special, research and university libraries. The next section describes what type of environment is being offered by these technologies, the better to understand the academic library's response to change.

#### IV. THE COMPUTERIZED LIBRARY ENVIRONMENT

Information Technology (IT) embraces the application of computing, communication and associated office technologies to the capture, storage, retrieval, processing and dissemination of information in various forms including voice, video, text and data. It includes electronic systems, consumer electronics, tele-communication, both the hardware and software aspects of computing and the design and production of computer based manufacturing system (Tung & Chim, 1990, p.B.34)

Information Technology or IT as it is frequently termed today is the convergence of computer and communication technologies; it includes, but is not limited to, communication technology. Moreover, as we are beginning to unravel, IT promises a lot more either computers or communications in isolation can deliver (Tengku Mohd. Azzman, 1987, p.1).

The above definitions are extremely useful as guides to keep discussion within a defined path, and to indicate what aspects of library computerization fall within IT. This paper does not presume to go into the technicalities of computerization of libraries which have been authoritatively presented in other forums. The interest here is solely to examine:

- (a) The impact of computerization upon 'reading' in an academic setting; and
- (b) The opportunities offered to an academic library which adopts IT to better its services and promote 'reading' for information and knowledge.

The discussion draws from local experience and is presented from the perspective of a university library operating away from the technologically-developed parts of the world.

#### Early Developments

Computerization, which began in American libraries in the 1950s, took over 20 years to reach Malaysia. Till today, many war-torn and disaster-ridden economies elsewhere in the Third World are yet to adopt computerization, which can only flourish on a base of literacy and economic stability. A technology-gap of 100 years may well divide countries at the top-most range of the Information Technology (IT) ladder and those at the bottom-most levels. This gap must

always be borne in mind when library computerization is described. However, when a latter-day economy does finally computerize, it is theoretically able to leap-frog all the lowest levels and adopt the very latest technology that is available.

For most libraries that began computerizing early, computerization was targetted at single processes, such as acquisitions, or cataloguing or circulation in single libraries. At a later stage, this progressed to a clutch of libraries in joint projects to tackle one or two processes. In Malaysia, this was exemplified by the now well-known project, MALMARC, which was essentially a joint cataloguing scheme by academic libraries and the National Library, nearly all of whom were operating off-line.

With the advent of microcomputers in the 1980s, word processing also became popular, and this type of computerization found their way into all types of libraries: academic, public, special and school libraries.

#### Into the 1980s and 1990s

Microchip developments throughout this period have benefited libraries enormously. Miniaturization technologies have produced:

Very small computers [which] have enormous advantages: firstly, because they consume minute amounts of power; secondly, because they are very cheap; and thirdly, because they are extremely portable... (Evans, 1979, p.58-59).

Miniaturization has also resulted in volume capacity storage being possible in tiny physical formats. The appearance of CD-ROM (Compact disc-Read-Only-Memory) has made it possible for large collections of texts to be stored in small discs and transported elsewhere to be read. 'A CD can hold about 600 megabytes of data, which is roughly equivalent to 200,000 printed pages or 400 large books' (Arms, 1990, p.32). Theoretically, this means that the contents of a million volumes can be stored in a few dozen shoe-boxes full of CD-ROM discs (2,500), with much better retrieval possibilities.

Current developments in computerization have also made possible the merging of sound and imaging to textual material, signalling changes to writing, publishing and therefore reading and information provision.

In Malaysia, this period has seen all the academic libraries computerizing on an integrated basis. All technical aspects of library work: acquisitions, cataloguing, circulation, catalogue enquiring by users; and library management procedures, such as inventory control, accounting, etc. have been taken care of

by one massive integrated software sitting in one mini-computer system. Information services via on-line access and CD-ROM databases are now quite common.

In addition, local academic libraries like other libraries, have also acquired the basics in text processing and desk-top publishing: purchasing software like PageMaker, and equipment such as laser printers. These are used for the production of library information and reader education materials such as accessions lists, handbooks, bibliographies, etc., which are tools in aiding reading.

### Into the 21st Century

For the future, libraries will have to look to IT developments and intelligent machines. These technologies will be used for teaching and learning; they will be adopted for providing information.

An IT environment will enable big networks over vast distances to be working in real-time. Information can be exchanged within the network immediately it is available at any one point. The 'information' can be very small in quantity, it can encompass pages of text. It can be a mix of textual, pictorial or sonic materials. Undoubtedly, therefore, IT is a phenomenon of the present and a tool for the future.

## V. THE LIBRARY RESPONSE

Given (a) reader needs and the nature of reading for information within a university; and (b) technological possibilities opened up by computerization and IT developments, it would take a brave library not to respond. This section describes the manner in which a university library is able to do so. A few examples are highlighted in terms of key processes.

### 1. Acquisition and Processing of Material

**Acquisitions: the Process.** Traditionally, a library waits for printed publicity to arrive via the post to the desk of the acquisitions librarian. Book catalogues and other publicity materials are passed to relevant academic departments after the library has made its selection, and orders from both are passed to book agents who then re-order with publishers. The library waits for the duration it takes to process these orders and for the materials to arrive by post, after which cataloguing is effected. Where more than one department is interested in the published material, much routing and re-routing of publicity is necessary. In later years, bulky Books-in-Print (BIP) volumes, with their supplements, have alleviated informational problems of the acquisitions process; but no library

dares circulate their BIP, and academic staff and students are only given very limited access to these tools, which basically remain as tools for librarians.

**Manual Cataloguing.** It is only after the item has been received that the library can begin to process it. A library that faces staff or staff expertise shortages will delay the processing. A library that has a chronic backlog in cataloguing, will foist further problems downstream to circulation and reader services.

**Problems.** Even assuming maximum efficiency all around, it could take up to six months before an item is made available for loan. In many instances, a year or two could elapse before reading against an ordered item can be effected by the user who ordered it. In the meantime, he could remain totally in the dark as to the state of his order.

The problems associated with these manual processes are many. Not all relevant publicity is received. They may be lost or thrown away by any single individual or department at any point in the chain. Information is haphazard. In all, a lot of time and energy has to be expended; much stationery used; bulky equipment (catalogue cabinets; visible index etc.) and much space taken up for filing and record maintenance.

**CD-ROM Technology.**<sup>1</sup> Today, the major publishers of academic material which are marketed freely via an organized book trade are still in the USA, the UK and Europe. Libraries without the necessary communications back-up and which are situated far away from these countries have benefited tremendously from CD-ROM developments. Publishers' databases such as Bowkers offer instant access to thousands of in-print titles. They have effectively allowed libraries subscribing to their databases on CD-ROM to continuously access a consolidated and current publishing situation easily and speedily, with a time-lag of only 3-4 months while waiting for updates.

The 'acquisition record' can be lifted from a publisher database, and downloaded into a viewing file. This can also be used as an initial, unedited 'cataloguing' record. It can be available immediately to the general readership throughout the entire library computer network; thus it is also a 'reference' record. Alternatively, full 'cataloguing' records can be 'lifted' from cataloguing databases such as Bibliofile and added to a library's local database at the point of time when materials arrive, cutting short processing time tremendously.

**IT Environment.** For libraries that operate within an IT environment, no waiting time at all is necessary, as they can be on-line to book agents such as Blackwells. Orders can be sent to agents by merely lifting a record from a publisher database and sending that to the agent, who processes it. Thus a process that used to take months or years can be reduced to days or weeks (the time an item takes to arrive by surface mail or air post). Simultaneously, at the library, order information can be viewed (by the user) as an item on order.

**Impact on reading.** Such developments mean that obtaining of relevant materials for information is much expedited. The processes of searching for relevant in-print materials can be conducted by many parties against a consolidated and updated database. The *act of reading* of the materials can be effected very soon after a relevant item is published. This narrows the information gap, in terms of time factor, between the developed and the developing nations; and has a subsequent impact on research and teaching by the 'reader'.

## 2. Collection-Building

A library collects that which is available on the trade market. For specialized collections such as private papers and incunabula, their scholars would have to journey to the holding libraries, even for preliminary viewing. For even less exotic materials such as old or expensive runs of journals and out-of-print materials, an academic library would have to wait till they surface onto the second-hand market, or wait for reprints and reprographic copies if interlibrary loans are not possible; or purchase as single articles under document delivery services.

Up to the present moment, librarians are used to acquiring unique bibliographic units (a book, a journal subscription, etc.) for current publishing. With current chip technology, it is beginning to look anachronistic as well as uneconomic to print single books that take up a lot of storage (shelf) space and are very heavy to carry around. This is especially cumbersome and costly if the books are huge; need a lot of coloured illustrations for explanation; and individual readers only need very small bits of information from them. Reference material such as dictionaries, atlases and encyclopaedia are good examples. Unlike fiction, they are never read from end-to-end; moreover, they need constant updating to be relevant.

For such material, publishers are beginning to behave differently. A database is maintained. The information is sold as CD-ROM, on disc or tape; or can be tapped on-line, depending on the type of informational database and the access capability of

clients. Research use of information contained in such references is that, often, they are cited (or incorporated) with research writings. Reader ability to download text and images for merging with one's own writing is thus an attractive feature. Examples are Atlas Pack (Electronic World Atlas); the Oxford English Dictionary on CD-ROM (1 disk for the 12 volumes); the Grolier Electronic Encyclopedia, and many others marketed by CD-ROM agents such as Udata, and others.

CD-ROM technology is also likely to take over the functions now performed by microfilming (film or fiche), as large private and out-of-print collections may be made available to libraries by the holding library, with added attractive features of indexing which therefore make information easily retrieval.

**Multiple subscriptions.** The nightmare of most serial librarians are linked with missing issues; claims, binding backlogs and shelf storage space. In addition, escalating journal prices often rule out taking new titles every year. CD-ROM agents now work with publishers to 'publish' multiple subscriptions in a single CD-ROM subscription, covering multiple periodical subscription. For example, UMI's 'Business Periodicals Ondisc' lists 338 periodical titles for a subscription cost of US\$14,950 (M\$38,000 at current exchange rates). An equivalent hard-copy subscription for all the 338 periodical titles is likely to be about M\$70,000-M\$75,000; **without** the convenience of searching, and **with** the problems of storage and administration associated with hard-copy serials control.

**Collection-building** must avail itself of these developments in electronic publishing. Indeed some texts, conference proceedings and certain journal titles are now only available in electronic format.

**Impact on reading.** These technologies open up new vistas for extending reading of significant material held in other parts of the world. Materials may be museum collections; diplomatic archives; war records; and so on, in addition to books and journals. The benefits of this are enormous and accumulative, as the whole body of a library's specific readership are spared the trouble and expense of having to journey elsewhere to view materials of their interest.

## 3. Circulation Processes

Computerization of the circulation process produces perhaps the most visible and immediate benefits. Traditional methods need long minutes in front of the card catalogues pursuing 'see' and 'see also' references, taking note of call numbers, and searching

many subject headings before an academic user can track the items he would wish to borrow. Mutilated or missing cards and misfiling add to his problems. A specific part of the catalogue can be referred to by only one user at a time. No one can refer to the catalogue once the library is closed. The catalogue of a big library can only be placed in one place; or is only duplicated at other locations with a great deal of effort.

With the installation of OPAC terminals under a computerized environment, the lives of both library staff and users are made easier. In a library that is run on top of a campus-wide communications system, reference can be made to the 'central' catalogue information from anywhere in the campus. Multiple users can simultaneously log-in to the central database (catalogue). This can be done without reference to library working hours. The more information that is available in the central databases, the more reference can be done against the catalogue independent of the reader physically coming into the library. By this method, library hours become more flexible; and the library system remains 'open' 24 hours of the day. Depending on the features of the circulation software package, loans, renewals and reservations can be done online, without the need to lug volumes all around. Catalogue information is available within seconds, and useful 'help' screens guide readers to cross-references which can be built into the catalogue database.

For the library, the tedious processes of filing and the purchase and storage of massive catalogues are avoided.

**IT environment.** Where a country already has the necessary communications over a wide geographic area, an academic library can tap into, and be part of a catalogue enquiry system. Thus, through SILAS, Singapore libraries all over the island are able to read each other's catalogues via the SILAS database maintained at the National Library. In Malaysia, through the proposed JARING network by MIMOS at the Prime Minister's Department, research libraries all over the country will be linked up, making bibliographic information on research available to all those within this national network.

**Impact on reading.** It would not be facetious to state that academic users will have more time for the actual act of reading, rather than fumbling around the catalogues. It encourages reading in that those who could not use the library during most of its opening hours are able to determine what they need in their own time; popping into the library just to fetch the items which they know to be available from the stacks, and borrow these items needed.

The feasibility of keyword and subject searches, and printing of personal searches, or downloading such searches to one's own computer, extends the circulation process into the arena of bibliographic research, itself an extension of reading; and a necessary part of the research process.

#### **4. Reference and Information Retrieval**

It is perhaps in the reference and reader services sector that computerization and IT holds out the most exciting promises for librarianship and reading.

**CD-ROM Technology.** Again, CD-ROM currently offer an intermediate solution to access. The vast array of CD-ROM subject databases available: on medicine, demography, education, economics and business, and many others, allow quick and detailed searches to be made, by the library and the reader, at relatively little cost. CD-ROM remain the only solution under conditions where:

- (a) a library, or a country still lacks the specialized communications infra-structures necessary for data (or voice and image) transmission; or
- (b) where the database owners are unwilling to entertain constant online access to their information, and would rather sell it in CD-ROM format.

**IT Environment.** Many academic libraries, however, would want on-line access to established databases for abstracting updated information. This is important for fields such as Medicine, Engineering and Law, where the latest findings and technical breakthroughs and judicial decisions could make a big difference to the reader in arriving at his own decision to deal with his specific case.

For libraries operating far away from centres of database holdings a combinational use of online searches (for updated information) and CD-ROM may satisfy both counts of need for current information and economy.

Libraries with the necessary infrastructures are able to access millions of bibliographic entries and information from hundreds of databases, such as MEDLINE, ERIC, Engineering Index and many others from any place and at any time. Many of these databases hold abstracts of findings. Others are full-text. In all cases, hard copies of full-texts are available on request.

**Impact on reading.** It is undoubted that current and focussed results aid in the research process. The reader is able to obtain information and knowledge in his topic of interest. He is able to read the material even though such materials are scattered all over the globe.



Voice (sound) and imaging techniques now available will become increasingly more popular and be made available more cheaply. Reference work will even be lighter yet more relevant. To satisfy a query on Beethoven's 'Emperor', for example, the librarian will not just fetch the music score of Beethoven's Fifth; his biographies; and the phonodisc, but will make a single electronic item available. From this, the 'reader' will read about, or hear about, Beethoven; read his score; hear the music; and with the possibility of having the part or the whole analyzed by critics. Under such circumstances, 'reading' assumes more immediately the more rounded concept of knowing at the broadest level.

Computer scientists are already experimenting with three-dimensional figures.<sup>2</sup> In future, computer accessories may make it possible for olfactory and tactile knowledge of objects described to be possible, in addition to visual and sonic simulation. Thus an exposition of, say, 'lavender', or 'otter' in computerized encyclopaedia may well permit the 'reader' to know totally by sight, feel, smell and sound what these plants and animals are. Under such conditions, the concept of 'reading' itself would have changed. It would have approached more the 'gaining of knowledge' concept: thus cutting short the processes of (a) reading and (b) interpreting. In many instances, both (a) and (b) would have been telescoped into one process, for knowledge upon such physical phenomena described.

### 5. Meeting Special Needs

So long as an institution deals with people it can expect that special problems outside the norm will arise. A university library that serves a varied student body can expect, for example, slow readers as well as the extra-curious and eager readers. A university that integrates the blind and the sighted, as does the University of Malaya, will need to pay attention to their reading needs.

Computerization has made it possible for special 'tuition' programmes to be drawn up to aid teaching. Slow learners can take themselves through learning a specific topic again and again, until they understand. The marriage of sound and image in computerization facilitate many teaching and learning processes.<sup>3</sup> For example, a student reading up on cardiac problems can be guided via computer packages, so that he can learn to diagnose one condition from another, after lecture hall expositions.

### Reading for the Blind

Sophisticated machinery, such as the Arkenstone software and dedicated computer system, have made it possible for the blind to 'read': in auditory or braille

format as an immediate reading experience, without the need for another human intermediary. The Arkenstone system enables the blind to 'read' immediately any printed text that he wishes. A scanner and computer system transforms the printed word into the spoken word so that the blind reader may 'browse' the article for relevance. If he is interested in retaining a copy of what he is 'reading' for future reference, he has a choice of a few formats. He may wish to take:

- (a) a taped version on cassette for listening (or audio 'reading')
- (b) a computer diskette version, which may be downloaded into his own PC; or
- (c) a braille version, if he is more proficient in 'reading' this format (with his fingers).

If communications permit, information may merely be sent along to his computer at home, without any intervening formats.

It can be seen from these four examples of key library processes and library-reader relationships that computerization and the IT environment have made for tremendous changes. Many possibilities are now available for aiding, promoting and facilitating 'reading' as practised within a university. The responsive library will adopt those developments that are feasible within its own technological and economic situation. It will have to keep on striving to maximize the amount of technology that can be provided to aid reading.

## VI. PROBLEMS AND PROSPECTS

The above sections indicate how computerization and IT have held out the promises of a future in proximity for libraries. But there are not only boons and benefits; problems too exist. As has been indicated in Section I, different countries (and libraries) are at different levels of computerization. There are many factors which may serve to hold back IT developments. A few examples are discussed below.

### 1. Communications

In order for any network to be established, specialized communications infrastructures must be available. These are high-speed, and ideally can accommodate voice and images besides data. Technologically advanced countries like the USA and Britain, and technology-aware States like Singapore are 'wired' up. This makes online access anywhere possible. In countries like Laos and Cambodia, on the other hand, where preoccupation has been with more fundamental issues of survival, none of these

possibilities can yet be realized.<sup>4</sup> Even in countries in between such as Malaysia, where Telekom has a full programme of communications development, there are many significant pockets of communications poverty. In some campuses like UM for example, the Library LAN (Local Area Network) had to be a temporary solution, as the proposed campus-wide communications network is still being planned.<sup>5</sup> Without adequate quality communications infrastructures that are internationally compatible, a full IT environment cannot be achieved. One cannot tap into, nor participate in, international networking.

This area is largely outside of an individual library's ability to solve. National communications remain a macro problem. An academic library computerizing ahead of its institutional capacity may well have to implement its programme in at least two stages, and solutions will be more messy and more expensive (for the library) than if a full communications structure had been provided from the start.

## 2. Personnel

The higher the technology, the more necessary it is for available manpower to plan for, deal with, and exploit the technology to the maximum.<sup>6</sup> Computerization and the speed of IT developments have largely caught many libraries unprepared. Many libraries find it difficult to tap enough of technical expertise (from any source) for their adoption and implementation of IT for reading. Within the library, a library may find it difficult to 'retrain' old staff to the necessary level of expertise.

Solutions may well lie within recruitment policies for new posts. Libraries will have to justify, and obtain, posts of systems personnel for its own staff. 'Trading' of posts is also possible: with a library giving up old posts of say, library officers for systems people to help plan and maintain systems. A range of strategies may be necessary. In UML, for example, preparation for computerization was planned more than a decade ago, and serving staff were sent overseas for training in various aspects of library computerization. In addition, systems personnel were borrowed from the Computer Centre to lend a hand. The advisory and planning Technical Committee for Computerization were drawn from the academic staff, headed by the Professor for Mathematics, and with the Faculty of Engineering and Computer Centre being represented to advise on communications and hardware. Without such voluntary dedication and cooperation, computerization on a larger scale will face many problems. In the final analysis, one hopes that the institution will heed the words of the Prime Minister. He urged:

Train your own manpower. Equip them for their changing tasks. Look after their interests. Upgrade their skills. Manage them well. And reward them for their contribution (Mahathir, 1991, p.21-22).

## 3. Perception

An insidious struggle has always to be fought against adverse perception: perception of what librarians can do; perception of what level of funding ought (or ought not) to be made available; and what type of posts are suitable for a library. Libraries may well face mediaeval perception that posts of systems analysts are not suitable for the library, but should only be in the Computer Centre and perhaps other departments, such as the Faculty of Engineering. Academic libraries which have to battle for their computerization programmes have to be prepared to dig in and change adverse perception on all fronts. The profession itself must struggle to change the unhealthy 'mindset of librarians' such as towards networking as a central activity (Ch'ng, 1991, p.30-31).

## 4. Funding

Although both hardware and telecommunications costs have dropped considerably, investments in IT infrastructures are still very substantial. For a fair sized library, say, like UML, the sum can run to a few million ringgit. In addition, costs of training staff; conversion of data and processes from manual modes to electronic format; purchase of equipment and databases, etc. demand a budget of many hundreds of thousands of dollars. Continuous support is absolutely necessary, and large amounts of maintenance costs must be envisaged into the indefinite long run. Pride in its own library may encourage institutions to totally fund the projects; but then again, they may not wish to, or may not be able to. Under such conditions, much frustrations will have to be borne by all.

## The Possibilities, the Will and the Way

IT holds many possibilities for academic work. Reading can be facilitated. Access can be speeded up. The process of obtaining knowledge and information assumes new formats. Indeed, the whole concept of reading is broadened through application of computerization and IT.

Libraries may well wish to take full advantage of all these advances. However, to do so, they themselves must be willing to change, and to accept the rigours that come with change. Given that will, they may still not be able to tread the path to progress if other resources are not subvented. Sufficient funding; good communications infrastructures and constant, and continuing support of various sorts must be made available.

There are no easy solutions. As in so many human enterprises, solutions may well appear by pure chance. Thus, in the case of UML, after battling twenty years without success for adequate funding, one, single, unique meeting with a far-sighted Minister for Education cleared the way for computerization on a network basis; and with full IT possibilities to be made feasible. In the case of Singapore librarians, computerization was part of a national plan. Much hard work and imaginative work was put in by librarians. Adequate funding in fact was not a huge problem at all. Though the factors to look to are similar for all libraries, the areas for concern, and which represent often insurmountable problems, differ greatly between individual situations. Undoubtedly, the greater the macro support and availability of resources, the easier it is for a library to seize all the advantages offered by IT as a tool for learning.

### **New Issues**

In analyzing the four basic ingredients of power, Toffler judged knowledge to be the most important. Furthermore:

Knowledge has gone from their being an adjunct of memory and muscle power, to being their very essence. (Toffler, 1991, p.17)

In the new era, academic libraries are not only information houses, but they are catalysts to fresh knowledge, after their stores have been processed by the minds of their readers, with the aid of computers. In this they will adopt a new role for power-broking. In this role they will need to guard their independence and be guided by their professionalism.

New issues will arise as a direct result of the new technologies: Licensing, copyrights, standards will be among many others of a practical and ethical nature that will have to be considered. The economics of information provision fits in well with Wawasan 2020's clear call to modernize: a proxy for independence and self-reliance. Pricing policies will have to be looked at. New services, which can be marketed, will have to be examined. In this, libraries will have to look to both their collections and their services. Elsewhere, databases have already been established which can be sold piecemeal (as individual access) or *in toto*. The same principles and procedures can be applied locally, as has been done elsewhere. Thus local databases in the fields of Law, Medicine and the Arts and Social Sciences can be offered to others to enhance their knowledge. They will need to be packaged, maintained and marketed properly. This in turn, will need funding and personnel (expertise). In all these issues and enterprises, while money and physical infrastructures are important, the most im-

portant is likely to be imagination and a certain daring and adventurousness of spirit. Risk-taking and the tackling of uncertainties have always been the companions of future planning. The risks are inherent, but libraries and librarians dare not not to take them, for the greater fear that they may become literary dinosaurs.

### **VII. CONCLUSIONS**

The terrible feeling for most libraries is that, even as they struggle to adopt the 'newest' technology, that it is already on the way to being obsolete. Unlike the good old catalogues of yore, that stood so solidly for over a hundred years, the days of Read-only-memory (ROM) must give way to interactive read-and-write memory; adaptable to different add-on scripts and sound. The essence is on change, the speed of which a library must learn not just to cope with, but ride alongside, and enjoy the benefits of its company. On this journey, a library should always remember, that as an institution, it is older than the best technology; and that all technology after all is a tool to achieve its ends. This perception is necessary, if a library is not to be overwhelmed by technological advances, and retain its focus on its role: to provide the platform for the humanistic interaction of reading for information and knowledge, and the passing on and exchange of ideas.

This perception is particularly appropriate to the objectives of 'Wawasan 2020', which is itself a concept for forward-looking policies, while retaining traditional values adjudged to be useful for one's own society, within one's own world-view (See Addendum). Within this concept, a library must be more modern, more self-reliant, more efficient and yet more caring.

### **The Readers**

Universities have seen their readers change from being very elitist, and specialist, to being more democratically constituted. In time, the computer literacy of all their readers will be taken for granted, as will their demand for audio-visual, computer-aided materials. Readers will come from the generations who have grown up on videotape Ladybird 'books' and computer games rather than on sight-read volumes, and to whom television characters will be more real than book heroes. To aid their 'reading' of Shakespeare, Austen, and modern writers, big-screen and video equipment and computerized packages may be a necessary introduction to the actual text, if not their direct substitute.

The present has seen readers with specialized reading needs such as the blind and visually-handicapped being integrated with the sighted. For the future, as society develops its full literacy programmes, other 'handicapped' groups may also be included into the university circles. For example, those who suffer from dyslexia,<sup>7</sup> or 'word blindness', 'defined as the inability to process language symbols' (Jordan, p.3) and the autistic may well be integrated, along with slow learners, and others with different types of disabilities. Specialized computers that can unscramble words to their satisfaction, or pace their development, and stimulate their interest on reading, may well be available. Within an IT environment, a library may not need to purchase specialized equipment and software, but may be able to 'tap' into or subscribe to, such software and programmes as are available to deal with these specific needs as and when they arise. The maximizing of human resources and their education is well in line with the caring concept of Wawasan 2020, besides being in line with its economic rationale of total manpower development.

## Reading

Over time, we have witnessed how 'reading' as a process and as a concept has shifted in meaning. The specialist in 'reading' his figures, symbols and graphic material, processes the information he sees, through his eyes, for knowledge. The blind, in 'reading' with his fingers, is informed. Today, he is also able to 'read' with his ears.

Oxenham, in his interesting treatise on literacy, raised a question which many science fiction writers have postulated in more dramatic terms:

At present, the impulses stored in a computer have to be converted into visual-pictorial, alphabetic or numerical - or sonic symbols in order to concord with the normal human modes of perception. Might it be possible for such impulses [information symbols] to be conducted directly to a person's brain without the medium of either sound or vision? (Oxenham, 1980, p.125).

When Man first thought of flying, others thought him to be mad. When later, Man dreamed of going to the moon, others thought it to be mere romance and judged it to be fantasy. The last hundred years have taught us not to pooh-pooh any idea, no matter how far-fetched it may seem for it has often been proved that the hand will wrought what the mind can conceive.

Should the above dream be realized, 'reading' may yet adopt a different meaning, and libraries will have to cope with it. In that environment, it is doubtless computers will play a part, and IT will bring the furthest information to the nearest reader. In the meantime:

There is obviously a lot for everyone to do. Unfortunately there is no simple one shot formula .... Many, many things must be done by many, many people. And they must be done as correctly as possible. We must be prepared to be self-critical and to be willing to make corrections. But God Willing we can succeed [Mahathir, 1991, p.22].

## ADDENDUM

### 'Wawasan 2020'

'Wawasan 2020' or 'Vision 2020', an inspired ophthalmological pun for a clear vision for the nation's future, was first coined by the Prime Minister, Datuk Seri Dr. Mahathir Mohamad (see: 'Vision 2020 is aspiration of people, says Dr. Mahathir', *New Straits Times*, 3 September 1991). The thinking, however, had been echoed much earlier in other speeches of the Prime Minister. Examples are those at the launching of the Second Perspective Plan and the Sixth Malaysia Plan in mid-1991; and at the Annual Dinner of Financial Institutions on 28 August 1991 (reported in *New Straits Times*, 30 August 1991).

The document that is generally referred to which outlines the central challenges of Wawasan 2020 is the Prime Minister's Working Paper at the Inaugural Meeting of the Malaysian Business Council on 28 February 1991, entitled 'The Way Forward', or 'Langkah ke Hadapan'. The paper poses 'nine central strategic challenges' that should be met in order for Malaysia to achieve the status of a developed nation. These include the realization of a united, democratic, caring, ethical and self-reliant nation, with peace, justice and economic opportunities for all.

In the ensuing months, 'Wawasan 2020' has served to become a stirring call to make Malaysia a developed nation by the year 2020:

The term 'developed nation' is likely to create in the minds of people the Western model of an industrialized nation with a high per capita income. What we would like to attain is not just income, but a society which balances material gains with intellectual and moral values (*New Straits Times*, 30 August 1991).

In his speech as UMNO President, addressing the Party's General Assembly on 8 November 1991, the Prime Minister explained 'Vision 2020' further in the following terms:

We have designed Vision 2020 which intends to make Malaysia a developed nation by the year 2020 .... The developed nation status that is meant is a nation that is capable of developing itself through the acquisition of knowledge, efficiency and high morals which will enable us to compete with other developed nations in all sectors (*New Straits Times*, 9 November 1991).

Within the concerns of this Seminar, this aspect is the most relevant, as is the sixth challenge posed by Dr. Mahathir, that of:

.... establishing a scientific and progressive society, a society that is innovative and forward-looking, one that is not only a consumer of technology but also a contributor to the scientific and technological civilisation of the future (Mahathir, 1991, p.3).

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#### FOOTNOTES

<sup>1</sup>The strong points and weaknesses of CD-ROM technology are well described by Caroline Arms, as follows:

The technology, usually known as CD-ROM (for Compact Disk Read-Only-Memory) when used as a storage medium for computers, encodes digital information by creating minuscule pits and bumps on a metal-coated plastic disk.... Copies can be pressed from a glass master disk for around [US]\$3.... The basic cost of storage capacity on CD-ROM is incredibly low; magnetic tape to store the same data would cost twenty times as much, and floppy disks two hundred times as much. The cost of the physical process has dropped dramatically in the last few years and can be under [US]\$2,000. The real cost of a compact disk derives from collecting, organizing, and indexing the information for convenient access. Since the market for services based on CD-ROM is still small, prices are high; typically, an indexing or abstracting service on CD-ROM is priced 50 to 100 percent higher than the equivalent service in print. As the market continues to expand and particularly as more individuals invest in CD readers, prices will come down.... Although the cost of storing information on CD-ROM is very low, the technology has important limits and will not supersede the more conventional magnetic disk technology that is now the primary medium for data storage. Once the compact disk has been pressed, the information stored on it cannot be modified. Hence, it is not suitable for applications that require absolute currency or for information that changes very rapidly, although it is ideal for material that can be conveniently revised annually, quarterly, or even monthly. The other problem with the technology is its speed. It takes ten times as long to locate a particular area of CD-ROM as it does to find an area on today's fast hard disks, and it takes twice as long to read data.... So, while CD-ROM may be ideal for a

personal environment or a dedicated stand-alone system, it may not be appropriate for sharing a heavily used database. A printed index often runs over many volumes, and several users can use a single copy simultaneously; if the same index is on CD-ROM... it is only available to a single user [Arms, 1990, p.32-33].

<sup>2</sup>Those who viewed the programme 'Beyond 2,000' aired over TV Malaysia on 12 April 1992 would have seen the amazing application of computers in creating holograms. Their usefulness to library work can well be expected.

<sup>3</sup>See, for example, Chan, 1991.

<sup>4</sup>See for example, Ch'ng, 1991, *passim*; Khoo, 1990.

<sup>5</sup>See *Kekal Abadi*, Vol.10 No.1 (March 1991). The issue was devoted to a description of the Library's computerization project.

<sup>6</sup>See for example, Regional Conference, 1991; Ong, 1989; 'A Vision of an Intelligent Island' Report, 1992.

<sup>7</sup>For some information on dyslexia in local schools see 'Harapan pesakit dyslexia untuk sembuh cerah', *Berita Minggu*, 12 March 1989; and 'Menangani masalah dyslexia: kesukaran yang mengganggu saraf otak dan kognitif kanak-kanak', *Berita Harian*, 21 March 1990.

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