The Use of Videodisc Technology in the Storage and Retrieval of Visual Information: The Hong Kong Polytechnic Library Experience

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THE USE OF VIDEODISC TECHNOLOGY IN THE STORAGE AND RETRIEVAL OF VISUAL INFORMATION: THE HONG KONG POLYTECHNIC LIBRARY EXPERIENCE

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INTRODUCTION

The Hong Kong Polytechnic (HKP), established in 1972, is the largest tertiary institution funded by the Hong Kong government through the University and Polytechnic Grants Committee (UPGC). It currently has a full time academic staff establishment close to 1,000 and a full time equivalent student population of 13,500, comprising 10,000 full time and 16,000 part time students.

The Polytechnic offers more than 200 courses in a variety of attendance modes, leading to awards ranging from Higher Diploma to Doctor of Philosophy.

The present Polytechnic Library opened in February 1977 and has a net usable area of 11,200 square meters. The Library houses approximately 600,000 items and is growing rapidly at a rate of more than 30,000 volumes a year. Over 9,000 serial and business materials is one of the largest in Asia. The Library of Congress Classification Scheme is used. The Library offers service to 45,000 active users, is open at least 78 hours per week during term time.

VIDEODISC TECHNOLOGY IN THE HKP LIBRARY

Optical disc storage and the retrieval of data have provided radical developments in the field of information science. At present, two optical disc formats predominate, CD-Rom and videodisc. Both formats can store vast quantities of machine readable text on a single durable plastic disc - as much as 600 million characters, or up to 275,000 printed pages, or equivalent to about 1,600 conventional floppy discs. Characterized by extremely high data storage, small physical size, (5 1/4", 8", or 12"), and high speed search access capability (the average access time is 1.5 seconds), optical disc technology represents a revolutionary new service for libraries, especially those in the developing countries where telecommunications can cause problems. With the continuous development of new products and services, as well as improvements to the technology itself, many aspects of library operations can be improved by optical technology.

The HKP Library, like many other libraries, utilizes various optical technologies as part of its role to provide information resources to the Hong Kong community. Extensive use is made of CD-Rom databases through a 12 station CD-Rom Centre which makes available over 30 databases. This CD-Rom Centre has been described in detail previously.[4,6,21] This paper, in line with the one presented by Burton in the 45th International Federation for Information and Documentation (FID) Conference and Congress [4], will concentrate on the utilization of videodisc technology in the HKP Library. A detailed description of the slide conversion project currently underway is also included.

MEDIUM FOR LEARNING

Videodisc is characterized by analog signaling, large video capacity, and access to individual frames independently of any of the other (for CAV or Constant Angular Velocity format only). The analog signals of the videodisc are created by frequency modulation, which is used both to write and retrieve video images from laser-burned pits. The technology enables as 12-inch CAV format videodisc to store 54,000 frames or 36 minutes of video images per side.
or a CLV (Constant Linear Velocity) disc to store up to one hour of motion video per side. Videodiscs are recorded in concentric circles. In CAV format, each track represents one frame that can be accessed individually, whereas CLV allows multiple frames per track thus longer recording time but at the loss of single framing. The CAV convention makes it easy to display still images on videodisc systems by repeatedly reading a single frame.

In addition to its pictorial storage and retrieval capabilities there are other features that make the videodisc a more acceptable medium than videotape. For example, picture quality, robustness, frame freeze facilities, slow/fast motion, and picture indexing, all make the videodisc an ideal medium for learning purposes.

With videodisc, complex visual events can be captured for study. A teacher can make use of a videodisc to teach foreign languages to students when words on a page, or voices on an audio tape do not represent the complex reality of language used in social situations. Lecturers of art can easily make use of discs such as the National Gallery of Art, Vincent van Gogh, or Picasso to illustrate the artist’s works and arouse students’ interest. The disc’s chapter index is a useful tool for students to locate relevant materials. Individual frames or segments can be quickly accessed. Two audio channels can provide either stereo sound or instruction in two languages or at two different levels.

**HKP LIBRARY VIDEODISC COLLECTION**

Videodiscs were first introduced in the HKP Library in 1986, and since then it has become the most popular medium. Usage was initially affected by a shortage of hardware. However, a generous donation from the Toshiba Company in 1988 dramatically changed the situation. Twenty-six sets of players and multi-system monitors were added to the hardware collection and the special features of videodiscs for education became fully available to library patrons. The Library uses large screens (31" and 52") for group viewing purposes and 21" monitors for individual and two-person carrels. Currently there are 35 workstations for videodiscs and 10 small group viewing rooms which can accommodate a total of 220 viewers.

The HKP Library now holds about 1,300 titles on videodisc. There are also about 12,000 titles on videocassette (3,000 of which are off-air recordings of locally produced documentaries on Hong Kong issues). The videodiscs provide valuable instructional support and are used as visual aids to illustrate points made during a lecture or to motivate students. The following is an analysis of the subject coverage of the HKP videodisc collection:

<table>
<thead>
<tr>
<th>Subject Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>History, Geography, Social Sciences, Languages</td>
<td>15%</td>
</tr>
<tr>
<td>Art</td>
<td>10%</td>
</tr>
<tr>
<td>Sciences, Medicine, Technology</td>
<td>20%</td>
</tr>
<tr>
<td>Music</td>
<td>10%</td>
</tr>
<tr>
<td>Feature Films</td>
<td></td>
</tr>
<tr>
<td>English language films</td>
<td>33%</td>
</tr>
<tr>
<td>Non-English language films (including Chinese, Japanese, French, Italian, German, etc.)</td>
<td>10%</td>
</tr>
<tr>
<td>Others</td>
<td>2%</td>
</tr>
</tbody>
</table>

It is worth mentioning that librarians from other institutions visiting HKP Library are often amazed by the wealth of educational discs. To many, videodiscs are still confined to feature films and music videos.

All feature films are recommended by academic staff to serve as teaching materials for courses in film studies. Normally selection is governed by strict guidelines and the Library will discuss with the requestor the
justification for the inclusion of some arbitrary items. Extensive use is made of feature length motion pictures in videodisc format by teachers of the departments of English, Design, and Applied Social Studies because they compel sustained attention, heighten reality, and offer a satisfying aesthetic experience.[3]

With the increasing popularity of the medium, the HKP Library will continue to develop its collection of videodiscs. As a rule, the Library prefers videodiscs when the same title has more than one format. Educational and course-related items will be the focus of acquisition, especially those on subjects such as sciences, medicine, technology, and art. Efforts are being made to acquire videodiscs produced by academic institutions and museums or galleries. Besides the American and European markets which produce most of the discs available, Japan is also an important source of supply. Numerous high quality discs on art and design are available there. The search for new sources is an on-going task for the audio-visual librarian.

MANAGING A VIDEODISC COLLECTION

Hardware Problems

Because of the high demand in the HKP Library, users are permitted to use a workstation for one hour only, with renewal allowed if no one is waiting. Serving a total clientele of over 45,000 and with the Library open for at least 78 hours per week, the drives are occupied most hours of the day. The HKP Library provides a team of technicians to do on-the-spot troubleshooting, servicing and regular maintenance. Each month there is an average of 200 failure reports.

Sixty percent of the hardware failures are caused by the drive overheating because of extended hours of use. About 25% breakdowns are caused by excessive scanning by users.[4]

Disc drives can normally operate for 3,000 to 5,000 hours before the disc head wears out. Many of the drives in the HKP Library have been in use for over 8,000 hours thus breakdowns caused by malfunction of the laser pick-up head are increasing. It is important to maintain an inventory of spare parts.

Currently all the disc drives in the HKP Library are for single side viewing. The introduction of drives that can play both sides was considered. However, it was found that because of the U-shape of the laser head, there will be read-in problems as tolerance becomes smaller with this design causing more problems than convenience.

Disc Problems

Discs are generally considered to be resistant to wear and deterioration. However, rough or improper handling is detrimental to the durability of a disc. In the HKP Library over 80% of the disc failures are related to tracking problems which can be caused by dirty hands, scratches or even glue. Dirty hands are hazardous to the discs and over 80% of the tracking problems reported are caused by finger prints left on the disc.

Defects on discs caused during replication also pose problems. New videodiscs received are checked and for every 150 discs there will be one with a tracking problem, especially for CLF discs. The problem may be due to roughness of the surface, the disc may have been bent during delivery, or there may be centering problems when lines on the disc are unstable and beyond the adjustment ability of the drive. Noise problems occur once for every 130 discs; and one in 300 discs is missing the read-in code, very often because the reflective surface is not smooth.
Recently the Library purchased a number of Hong Kong produced discs and because of the low quality of the discs, one actually cracked into pieces when the laser head was revolving. This is because the two single-sided discs laminated together to make the final double-sided product were not balanced.

Another problem occurs in locally produced feature film discs. Extracts from other films are added to the actual program (either at the beginning or end of the disc) and these often contain obscene or violent scenes. Whilst the Library has no intention of imposing censorship, we do not think that users should be exposed to scenes that are not part of the program purchased. To solve this problem, two small marks using a lumocolour pen, opposite each other, were made near to the edge of the disc. The width of the mark has to be between 5mm and 10mm such that the laser head will not be damaged. The length of the mark depends on the time duration of the unwanted parts. By making these marks, the laser head will stop at the end of the unwanted program. Nothing can be done regarding trailers at the beginning of a disc.

INTERACTIVE VIDEO DISCS

David Clark used the term "twenty-first century books" to express his optimistic view of the future of interactive videodisc technology. Videodiscs combined with computers offer learning and storage capabilities which libraries cannot afford to ignore. The term "interactive" videodisc system (IV) comprises a disc player, a host computer, a monitor, and an interface - a linking device enabling the computer to control the pace and sequence of the video.

Capabilities for Education and Training

IV permits increasingly sophisticated training and instruction, with no other medium offering the same degree of complexity and flexibility. But it is in the ability to give individualized instruction that IV is unique. Because control remains with the learner, the videodisc system is self-paced and responsive to individual learning speeds. It presents material at the appropriate level for each individual trainee. It enables the learner to choose what is relevant without going through material that is not wanted or needed and it functions as an infinitely patient tutor. The learner will not be bored nor will he need to worry about peer evaluation or judgement.

Regarding the advantages of IV in training, Rogers has summarized them as being: faster learning and increased retention levels, greater convenience and reduced cost, and measurable results allowing for assessment of progress.

Hosie and Barker have recapitulated those findings and studies which indicate that interactive videodisc technology can be a useful educational medium. It is as effective, if not more effective, as lecture.

IV lends itself to many applications in a wide range of fields including languages, medicine, social sciences, education, art, business, management, science, and technology. A voluminous wealth of literature has been written on the potential use of interactive videodisc technology.

Interactive Videodiscs in the HKP Library

The HKP Library implemented interactive videodisc systems in 1988 and now has seven workstations.
Issues and Problems

1. Users welcome interactivity. User studies have been carried out every year since 1988 when IV was first introduced in the Library to monitor the general response of the patrons to this new technology.\(\text{[4,5,6]}\) In the previous surveys in 1988 and 1989 emphasis was placed on the content and structure of the programs, whereas in the one carried out in 1990, the users were asked questions on software and hardware. The general response was that library patrons welcome the idea of this self-learning tool. IV compares favorably with other formats of instruction. On the whole, users believe that the instructions in the programs are simple and can be easily mastered, and they find operation of the hardware easy.

2. Teacher acceptability. The thought that an instructor might not be necessary in the delivery of knowledge, attitudes, and skills is difficult for many. Therefore teacher acceptance of the technology is an important hurdle to overcome. In order to test the attitudes of the teachers towards IV, this year instead of studying the response of students, we carried out a small scale survey on the academic staff who have used IV with the students. Our study focused on the lecturers from the departments of English and Management Studies as they tend to use IV more than others.

Interviews and discussions were held with six lecturers (each having an average of 10 students in the class) from these departments and the findings are very encouraging. First of all, they have positive answers to the relevancy of the IV programs to their field and considered those programs suitable for their students. They also agreed that given the same amount of time, users can learn more from using IV programs than reading textbooks. They again confirmed the favorable response of the students to IV.

Finally, to the questions designed to indicate their willingness to use IV programs in future, they gave a positive response. They would incorporate IV programs on their reading lists, would show more IV programs for class lecture, and they believe that IV learning will become a trend in educational activities in the future.

Lecturers of these two departments recognize the potential of the medium and make sensible use of it. They do not only advise their students to come to use the IV programs, they also tried to use those programs in class. The effectiveness of applying IV to small group sizes is demonstrated in Cockayne's recent study.\(\text{[9]}\)

There is still a long way to go before lecturers of other academic departments adopt IV technology as a teaching aid. More promotion regarding the effectiveness of IV will be necessary. Teachers will need to adopt a more managerial, as opposed to an instructor role, if IV is going to be used extensively. Also, more high quality and appropriate programs should be produced.

3. Collection Building. IV programs are produced by commercial publishers, research institutions and also by libraries and museums, particularly those involving art and design. Lack of information of the market availability of the programs or directories like those for CD-Roms is a current problem faced by IV users, and potential users. In many instances information professionals have to rely on their personal experience. Also, not many generic programs are available. Distribution and publication of projects by libraries and museums are very often limited by the copyright constraint. All these are obstacles in the acquisition of IV programs.

4. Selecting an IV system. In view of the high cost of IV systems, it is necessary to spend time and effort in the selection and evaluation process. In determining the appropriateness and cost-effectiveness of the technology,
Henderson and Copeland have given some constructive ideas, namely, to have a
thorough understanding of videodisc technology, to consider the objectives,
level, accuracy, currency, and comprehensiveness of the content of the
program, to note the role of the computer in instruction, to evaluate the
presentation, production and design of the program, to consider whether the
program is user-friendly and lastly, to note that documentation and support
materials are complete. All these have to be taken into consideration when
deciding on the purchase of an IV system. In all cases, preview is
essential.[14,10]

5. Linkage between users and vendors. In the HKP, collection development is
the joint responsibility of the academic staff and librarians. Normally the
library will keep the faculty informed of the availability of appropriate
programs and also organize previews or demonstrations for the academic staff
before any decision on the purchase is made. Having established close working
relationships with the academic staff, we are able to identify their
requirements, take note of their experiences in using the collection and their
feedback, etc. In turn, librarians should pass on users' comments and
feedback to the vendors so that improvements or services required can be
fulfilled. It is important that librarians should be more active and
consciously function as an intermediary between users and vendors.

6. Costs. The cost factor seems to be the major problem that libraries will
face when they consider utilizing IV technology. The time and manpower
involved in the development of interactive programs is enormous, so the
systems produced are usually expensive, particularly when they are not
produced for wide distribution. There is no sign that prices will decline.
On the contrary, some suppliers have recently increased the prices of their
products. IV is a burden on library budgets and playback equipment will also
be costly and many institutions will find it difficult to afford. Funding
must also be allocated for maintenance of the equipment purchased.

7. User assistance and staffing. Although IV programs are normally easy to
operate, assistance to users is still necessary. Often they have problems in
synchronizing images and text probably because they start the disc too
quickly, well before the computer program is in operation. Sometimes, the
user will encounter difficulties in operating function keys. Library staff
have to come to the assistance of the users in such cases and hence staff
training is necessary.

8. Hardware compatibility and technical support. Standardization plays an
important role in the adoption of new information technology. The standards
involved are the interface standards (Videologic MIC for Europe and USA, IBM
Intowindow for USA, Sony View for Japan and USA etc.), standards for data
storage on the medium, compatibility of players, plus the existing broadc-
asting standards (PAL, NTSC, SECAM). Each time a program is acquired it is
necessary to confirm with the supplier whether the program can run on one's
present system, or if it requires a specific interface or videodisc player.
All the IV programs in the HKP Library are on PAL system. However, with the
release of a dual system drive by Sony and Philips, users of IV will find life
easier for them.

It is also important to secure technical support for the hardware acquired.
When IV was first installed in the HKP Library, difficulties were experienced
in importing an industrial drive as no local agent could guarantee technical
support. Our first drive was actually directly ordered from Holland.
currently we are able to obtain satisfactory technical support from Sony and
Philips, the two major professional videodisc hardware producers in the
territory.

9. Installation problems. Frequently there are problems in installation, most
often because of insufficient information given. For instance, lengthy
time was taken and numerous difficulties encountered in installing "Meddix Data". In cases when the operation instructions are ambiguous or insufficient, a great deal of time has to be spent on installation. Staff proficient in computing are required to perform the task. This has a considerable effect on the training of library staff.

CONVERSION OF SLIDES ONTO VIDEODISC

Videodisc technology can be applied as an aid in the management of visual resource collections. Videodiscs, when interfaced with a computer, have many desirable features for storing and retrieving images. Videodiscs offer extremely compact and reliable storage, allow immediate retrieval, offer random access, cannot be overwritten, can be replicated cheaply, have a long lifetime, are not erasable, and can be used in single frame mode.

Numerous successfully completed projects show that analog optical disc technology is well suited to storing picture reference files, product or picture archives, and museum and art collections. Large libraries and museums in America, United Kingdom and Australia such as the Library of Congress, the National Gallery of Art, the Stanford University Library, the National Library of Australia, the State Library of New South Wales, and the War Memorial Museum of Australia, etc. have undertaken projects to transfer their visual image collections onto videodisc.[20,19,16,2]

Currently the HKP Library is preparing to convert its slide images onto videodisc.

HKP LIBRARY SLIDE COLLECTION

The HKP Library Slide Collection contains approximately 160,000 slides, the subject coverage and percentage are as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art in general</td>
<td>5%</td>
</tr>
<tr>
<td>Painting</td>
<td>13%</td>
</tr>
<tr>
<td>Drawing</td>
<td>7%</td>
</tr>
<tr>
<td>Sculpture</td>
<td>13%</td>
</tr>
<tr>
<td>Photography</td>
<td>3%</td>
</tr>
<tr>
<td>Architecture, Interior design</td>
<td>10%</td>
</tr>
<tr>
<td>Product design</td>
<td>5%</td>
</tr>
<tr>
<td>Fashion</td>
<td>16%</td>
</tr>
<tr>
<td>Hong Kong (all aspects)</td>
<td>12%</td>
</tr>
<tr>
<td>Others (Management, technology, medicine, science, etc.)</td>
<td>16%</td>
</tr>
</tbody>
</table>

About 20,000 slides are on Hong Kong subjects, and are products of location shooting or in-house production. Slides are arranged by the Library of Congress Classification Scheme and kept in drawers in filing cabinets. Eighty percent of the slide collection is catalogued and each individual slide carries a unique call number. Access to the collection is via the Online Public Access Catalogue (OPAC). Once an item has been located on the OPAC, a user has to note its number or numbers and then go to the filing cabinets to obtain the actual slide. They also can go direct to the filing cabinets to browse and to select. Use of the collection is increasing and over 40,000 slides are used annually.

Objectives of the Project

The purpose of the project is to offer to users an enhanced service by putting a collection of visual material on videodisc of high storage capacity (54,000 images, or the equivalent of 675 slide trays) and interfacing or linking the
videodisc player with a computer. This will permit sophisticated searching of
the disc and instantaneous retrieval of visual images.

Other goals of the project are to provide for the preservation of the slides
concomitant with increased access to their contents, and to avoid the use of
the originals for purposes of selection. Manpower can also be saved from
filing and refiling of the slides.

One of the exciting aspects of the project is the ability to browse through an
entire collection or sections quickly. Lecturers can use the database for
course preparation, tests, workshops, orientation and research, and students
will be able to quickly interact with the massive database to explore the many
dimensions of art and design.

Multiple copies of the disc can also be made cheaply and these may be
circulated easily to academic staff or researchers. By the same token, slides
from other collections can also be included in the image database.

Overall Design

The conception of the project was in 1988 when interactive videodisc systems
were first installed in the Library.[6] But because of the high cost involved
it was not until December 1990 that a fund of US$ 25,000 was allocated to the
Library to carry out this project. The project team includes the Media
Services Librarian, the Slide Librarian, and the Library Photographer, with
the project being overseen by the Polytechnic Librarian. An outside
consultant is added to the team in the later stages.

Initially, it is necessary to evaluate how the picture database will be used,
and the information retrieval needs of the users. The HKP slide collection
acts as a teaching and learning aid to the staff and students of the Swire
School of Design in particular, and to the entire Polytechnic community in
general. By identifying the system requirements of the target audience, it
will help in the design of the system to satisfy the user requirements and
usage patterns.

What to Include in the Disc

One problem was to determine the type and quantity of material to be
transferred onto videodisc. After extensive discussion, it was decided to
include:

1. All slides produced by the Hong Kong Polytechnic Library
(taken by the Library's photographer in exhibitions and shows)
covering subjects such as fashion, architecture, Chinese customs,
exhibitions, shows, and current events. There are about 20,000
slides under this category.

2. Slides from the Hong Kong Government Information services, the
Public Records Office, the Museum of History, and the Hong Kong
Tourist Association for images of historical significance and
other subjects which the Library Photographer would have
difficulty in shooting. There are about 1,000 images.

3. Slides from external sources. About 25,000 slides which the
Library purchased from commercial producers or museums and
galleries. All slides are on art or design related topics. Those
of poor quality after heavy use will not be transferred. From the
fashion slides purchased from external suppliers (for shows in
Paris, Milan, etc.) only those shot in the last three years will
be included (about 5,000 slides).
4. Slides from academic departments. Staff of The Swire School of Design who hold a wealth of slides have been informed of the project and invited to lend visual materials for inclusion, particularly in areas in which the Library collection is weak, namely, industrial design and photography. The project offers a unique opportunity to strengthen the collection. It is estimated that there will be around 1,000 slides in this category. The project will therefore cover approximately 47,000 slides on art and design related topics.

Copyright Clearance

With the firm belief that the Library should strictly adhere to copyright restrictions, efforts to secure copyright clearance from the suppliers concerned were made. Letters requesting permission to transfer slide images onto videodisc were sent to 60 commercial producers, galleries, and museums who had supplied slides to the HKP Library since 1985. So far replies from 40 sources have been received. All except two of the responses were favorable and these include those who had supplied a large quantity of slides to the Library (e.g., Creative Concepts of California, Centre for Humanities, etc.)

All museums and art galleries granted us approval to transfer slides onto videodisc for educational purposes, although some like the National Gallery in London charge a minimum cost of GBP50 for permission to transfer 200 slides. Most of them have stated that the videodisc should be used for educational purposes and must not be sold. The two unfavorable responses did not reject our request only indicating that they had no right to grant approval.

Retrieval Software Design

For the design of the retrieval software, an outside consultant will create the computer software based on the following specifications provided by the HKP Library:

1. The retrieval systems should be sufficiently user-friendly to allow for a maximum degree of interaction similar to an interactive videodisc system.

2. Only one monitor should be required to handle both the search and the image retrieved.

3. Users should be able to search by the desired artist's name, title of work, or class of subjects, or a combination of them.

4. Searchable fields should include: author, title, call number, date of work, subject and subdivisions.

5. Users should be able to limit their sets retrieved by using Boolean operators: AND, OR, NOT, e.g. Picasso AND Painting.

6. In the title field, the system should support "wild card" searches by truncating terms.

7. Images should be displayed when the user is searching so that the user can decide which frame to choose.

8. The textual information should be linked to the image of the corresponding artwork.

9. Frames retrieved may be saved for future use for class lectures and presentation purposes.
A system written by a Hong Kong firm, Advanced Media Systems, will encompass all the above requirements, plus additional features which will facilitate easy use.

For the operating system, Oracle on SQL database will be used because of the industry standard, portability, sizeable to meet user needs, maintainability, changeability and easy to use tools. The system will consist of six main modules:

a. Main enquiry and selection.
b. New user help and information.
c. Opening loop and information.
d. Display of selected images.
e. Database maintenance and back up.
f. Installation, implementation and conversion modules.

1. Enquiry and Selection Module

From the user's point of view the main enquiry and selection module is noteworthy. The following is a brief description of the database construction.

The program allocates input fields to each catalogue record, eight of which are search fields:

a. Title or work.
b. Author's/Artist's name.
c. Call number.
d. Date of work.
e. Subject.
f. Subject subdivision.
g. Topics (up to six).
h. Image number.
i. Various keys and pointers for efficient database access.

The software offers access to the image database through artwork title, artist's name, subjects, or by keywords. It is possible to search slides under any one or more of these headings or under any combination of these headings.

The user can enter data into one or more of the entry areas by using:

a. Free text entry (e.g., Subject: Hong Kong Fashion).
b. Free text plus wild card (e.g., Subject: Hong Kong F*).
c. Keyword selection.
d. Blank.

Any field can be left blank in which case no selection match is made against that field when the database is searched, thus allowing any entry in that field to be acceptable.

In the case of KEYWORD selection, the user can select a list of keywords that are available for the field currently entered by using the mouse or keyboard.

2. Comparison of Images

A feature of the design which is worthy of note will be the image selection screen. One of the concerns in the past was the lack of side-by-side comparison of the images when the database is being searched.

After a user has chosen his selection criteria and starts database selection, varying numbers of database hits will occur. A broad selection will produce many hits while a detailed selection will have few or only one hit. Each of
the images is displayed as each hit is found and images are displayed at a rate of approximately one per second. While the user views the screen the database search continues, marking hits, keeping a hit list and a hit count, which is displayed in the lower right corner. The user then has the choice of re-starting the selection process, stepping to the next 16 images, or canceling the search. This may be because too many or too few hits match his selection criteria. The user can then reselect his criteria.

In this way, the user will be able to compare different images. For example, the motif "The Mourning of Christ" drawn by Durer, can be compared with that drawn by Holbein, Grunewald, Huber, etc.

3. Personal Memory and Presentation

At least 80 frames of images can be stored for later use which enables a user to select the images, then prepare a list in his preferred sequence, and save the list for presentation or lecture use, in the same way that he prepares the order of slides in a slide tray. The user may also delete certain records from a retrieved list and then re-insert them in the order which he requires.

4. Updating

The proposed system allows for adding new images onto hard disk files. Once the image is on the hard disk a user would not know whether the viewed image came from the hard disk or the videodisc. Of course, a very careful examination will find that the image from the hard disk is a little too "hard". This function is an important one as it allows small numbers of images to be added to the database without the need to re-cut another disc. In this way images can be added periodically until there are a sufficient number to cut a new or additional disc. As an average image takes approximately 200KB each or five images per 1MB, 50 per 10MB, etc., large amounts of hard disc capacity are required. The initial installed system has space for 5000 images using a 5 1/4" optical data disk using modem rewritable optical technology.

5. Input of the database information

Basic input modules will be produced to allow for easy and efficient input of the database information. It is planned that the catalogue date of all the slides will be downloaded from the Catalogue Subsystem of the Library's main system (the HKP Library uses the Data Research System, formerly known as ATLAS) onto a PC to create a database of textual information, thus saving a large re-input of data. In addition there will be a record time module to link recorded video frame number to slide call number. Finally all these database parts will combine to form the complete system.

6. Hard copy

It is possible to print on a video copy processor all image information that has been found during the search. High quality copies can be obtained from the printer.

To summarize, the system caters for large storage capacity, multiple simultaneous access of up to 16 static images from different parts of the disc displayed at the same time on a single screen, and other features to allow for ready and fast retrieval.

Transferring Images onto the Disc:

This is an integral part of the whole project and the most costly and time consuming. In addition to many hours in the Library researching and evaluating the experiences of completed projects in libraries and museums outside Hong Kong, the planning team also spent hours in contacting and
visiting production houses and hardware suppliers and other experts to obtain specialized information, and also to test the quality of the output from different methods. As the current project is the first one in Hong Kong in which such a large number of slides (up to 47,000 pieces) are to be transferred to a single frame, we have to rely on experiences from overseas. Several different options were considered, each varying in cost, quality of output, and time taken for the complete transfer.

1. Converting Slide to Tape.

a. Copy individual slides to "copy slide" film in 1,000 frame lengths, join each length together then telecine to videotape as if it were a normal film. This method is estimated to cost about US $30,000 if done by commercial sources. Quality and consistency are not guaranteed.

b. Copy individual slides via a telecine direct to master tape (Betacam/1") by using commercial sources. The slides are single frame recorded. This method produces the highest quality, as well as the greatest variation on price against quality, ranging from US $60,000 to US $100,000 (in which case a very sophisticated telecine is used), and the time span varies from 60 days to six months! Not a single production house to our knowledge has ever transferred such a large number of slides!

Both methods require sending slides outside the Library. Besides cost, another consideration against sending slides to an outside production house is that the source materials must be in very good shape and work is necessary to "prep" the materials before they can be sent out for filming.

c. Converting individual slides onto Betacam tape, by making use of internal resources -- Betacam tape recorder. The use of internal resources has the advantages of quality control and also the slides will not leave the Library building and thus our services to the users will be least interrupted. The disadvantage is that the process will take over five months to complete and the labor and time needed will impose a heavy burden on the internal resources which are in high demand by other Polytechnic departments.

2. Use of Recordable Disc.

With the advance of optical disc technology, another method was considered. The write-once laser videodisc recorder produced by Sony or Panasonic provides an instant medium for transferring slides onto disc. By using the recorder, images may be recorded as they become available. The quality can be assessed during recording and images may be previewed immediately after recording.

The cost for a Sony recorder is around US $22,000 (a Panasonic costs around US $12,000). It was only very recently that we were able to see a demonstration of the videodisc recorders produced by Sony and Panasonic in Hong Kong, despite both items being released to the American market in 1990.

With the assistance of Sony (Hong Kong) and Advanced Media Systems who are eager to see the smooth implementation of the first slide conversion project in Hong Kong, the Hong Kong Polytechnic Library decided to use the Sony write-once laser recorder (LVR6000A) to transfer the slide images onto the disc. Once the disc has been recorded, it can be sent away for mastering and replication. Sony's write-once disc has been accepted as a source for laservision pressings (Haywood, 1990) while previously 1" C-format tape was the only recommended source. Direct mastering from disc keeps resolution loss at a minimum. Recording can also be done at a remarkably high speed. It is estimated that an average of 2,000 slides can be transferred per day. The transfer process will start at the beginning of July 1991.
Hardware Delivery

Hardware for a stand-alone workstation includes: Microcomputer (386DX, 100% compatible, 80 MB hard disk), dual standard laser disc player, interface card (Videologic 4000 card), VGA monitor, and video copy processor.

Future Developments

1. In-Library Local Area Network on PC.

Networking within the Library will be a suitable approach if the database needs constant updating. At present, additional images must be added, or deleted in all the stand-alone station - tedious work! A network will allow all database information, hard disc images and control to be centralized in one location at the master station or server. Thus changes need be only made once. The hardware required for in-library local area networking is very similar to that of the stand-alone stations, although the master station will need a larger hard disk (up to 1,000 MB) as well as a network card.

2. Local Area Network (LAN) and Wider Area Network (WAN).

The Polytechnic is currently evaluating a large campus wide LAN to LAN and LAN to WAN networking. There is the possibility for the slide retrieval system when completed to be connected campus wide. If such is the case, then the present investment of any hardware database system would be well spent as it could be incorporated into an expanding system and allow access of the picture database from anywhere on (or off) campus which is what we are aiming for.

CONCLUSION

The HKP Library houses one of the largest audio-visual software and hardware collections in Hong Kong. The Library advocates the philosophy that users should be given the opportunity of using media other than printed works. Audio-visual media in a library collection should be more than just the same kind of information in another format. Audio-visual media can demonstrate some things that books never can. It is hoped that one day, as de Vries remarked, users and librarians consider that it is difficult to see how one can manage a library and provide a proper service to the users without audio-visual media in the collection.[4]

The utilization of videodisc technology in the HKP has come to a new stage with the undertaking of the slide transfer project. No one can be certain where storage and retrieval will be in the next two or three years with the rapid pace of technological developments. However, it is certain that analog optical disc technology available today offers distinct advantages for applications requiring the storage and retrieval of color images. For libraries like the HKP with a sizeable collection of slide images, optical disc may well offer an affordable solution and one that is fairly easy to implement.

Just as Raitt has remarked, the librarian cannot afford to wait until the market and technology evolves since it is continually evolving. The Librarian has to be in there, involved with technology right from the start, and it is only be so doing that we can achieve our goals.[17]
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