Developing electronic resources at the KFUPM library

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Abstract

This paper presents an overview of the development of electronic resources at the King Fahd University of Petroleum and Minerals (KFUPM) Library. It will highlight KFUPM Library experiences in developing these electronic resources, which were essentially provided as an alternative/supplement to the print and microform collection, in order to satisfy the information needs with greater speed, accuracy and efficiency. The paper will also highlight the use of the KFUPM Library Web site and Internet to enhance the library collection, expand services, and improve operations to provide access to a growing array of internal and external electronic resources. Finally, the authors wish to share their experiences particularly with the library professionals of the Arabian Gulf region.

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Introduction

An increasingly important function of academic libraries today is the provision of information in electronic formats. Today libraries are providing electronic access to a wide variety of resources, including indexes, full-text articles, complete journals and Internet/Web resources. In fact, libraries have been moving towards an electronic environment, in which sufficient computers are necessary for patrons to access information.

The array of electronic resources available in libraries today is an outgrowth of the changes in information delivery made possible through advances in both computer technologies, such as powerful personal desktop workstations, and information storage and delivery mechanisms, such as CD-ROMs and user-friendly graphical user interfaces (GUIs). These advances make the ongoing efforts to replace other traditional services and processes with electronic versions attractive and economically feasible for many libraries (Fecko, 1997). Libraries are sometimes faced with choosing one format or another. Electronic versions are certainly more accessible to a wider audience. Users may be able to access electronic versions from their offices or homes, when they have never before had the opportunity to take print reference materials out of the library, except under special cases. There are a variety of electronic resources available to libraries and many ways to package these resources. A library may place a database on the hard disk of the computer, purchase a CD-ROM, invest in a modem for online searching, or even retrieve information via the Internet and the World Wide Web. Regardless of the manner in which they are packaged, all databases are generally similar in definition and in the ways that they are searched by the user (Dickinson, 1994, p. 5).

Selecting electronic resources is not so simple – librarians must choose from among a wide variety of options. In order to select the best resource, the library staff must be aware of the underlying theory of electronic databases and understand the impact electronic resources can have on a library. In fact, because of the explosion of electronic resources and its complexity, there is now more than ever before a pressing need for guidance in developing such

resources. This not only depends on the size of the library but more importantly on the goals of the program and needs of the users.

Background

The University

The King Fahd University of Petroleum and Minerals (KFUPM) was established in 1963 as the College of Petroleum and Minerals. In 1975, it became the University of Petroleum and Minerals and in 1986 the University was renamed The King Fahd University of Petroleum and Minerals. Eighteen programs are being offered at the Master's level, and nine at the PhD level in the fields of Engineering, Science and Management (KFUPM, 1995, p. 4). The University offers a Bachelor's Degree in four areas of Applied Engineering, three areas of Computer Science and Engineering, five areas of Engineering Science, two areas of Environmental Design, three areas of Industrial Management, and five areas of Science (KFUPM, 1997).

The Library

The KFUPM Library has a separate building located at a walking distance from most of the academic departments of the university and has an available floor space of nearly 7,000 square meters (KFUPM, 1985, p. 20). This four-story spacious building provides enough room for operations, resources and services, together with 300 seats for general reading and 148 study carrels. An auxiliary storage area for less used materials and an auditorium are provided (KFUPM, 1994, p. 1). It is the most modern library in the Gulf region. The current collection of monographs and bound periodicals totals 346,272 volumes (about 10 per cent are in the Arabic language), 80 per cent in Science and Engineering, and 20 per cent in Humanities and Social Sciences. In addition, there are 487,300 research reports on microfiche, 25,173 educational films and other media, subscriptions to about 1,259 periodical titles, and 37,530 reels of journals on microfilm (KFUPM, 1999). The Library serves a community of more than 11,520 people at the University. In addition, it provides direct borrowing privileges to Saudi ARAMCO.

The Library frequently extends its services to local government agencies and private institutions.

The KFUPM Library is an open stack library allowing its users direct access to the collection. The material is arranged according to the Library of Congress Classification Scheme. All library activities (cataloging, acquisition, periodical control, searching, circulation) are controlled through an integrated DOBIS/LIBIS automated online library system. Bilingual (Arabic-English) terminals are available for searching the online public access catalog (OPAC). Terminals are also provided in academic departments for searching library records. The library provides access to CD-ROM databases and has online access to different national and international databases through GULFNET (Gulf Network) and other commercial online services. It also provides access to the Internet/World Wide Web and maintains its own library web site at the http://www.kfupm.edu.sa/library/libraryhomepage/index.htm

Purpose and scope

Purpose

The main purpose of this study is to present an overview of the development of electronic resources at the KFUPM Library. It will also highlight the KFUPM Library experiences in developing these resources. In addition, the authors wish to share their experiences particularly with the library professionals of the Arabian Gulf region.

Scope

Electronic information resources considered in this paper include but are not limited to online search services, online public access catalogs/systems, compact disc search services, Internet sites, World Wide Web products, electronic texts, multimedia and other sources of information that users may directly access in an electronic format. CD-ROMs used in libraries included those on stand-alone stations as well as those that were networked. Internet resources included electronic resources found via the World Wide Web, gopher, telnet, file transfer protocol (ftp), and e-mail. This paper

also considered online databases from such vendors as DIALOG and ORBIT.

Literature review

There are practically no specific references concerning the Arabian Gulf region in relation to the topic of the present study. However, the data has been mainly drawn from various internal documents published by KFUPM and the Library. Also, articles published by the KFUPM Library staff in various international library and information science journals have been extensively cited. The authors' own experiences in the development of electronic information resources and related areas have been invariably used.

Electronic Information Resources Program: general features

- Electronic Information Resources Program is a long and involved process and should be carefully planned. Librarians who carefully weigh the experiences of the libraries offering electronic resources and who consider and prioritize selection criteria, will make the wisest choice and will have a program that makes the transition to electronic resources with relative ease (Dickinson, 1994, p. 37).
- As the library begins the selection process, one of the first steps to be taken is to develop a list of the kinds of products the library will be first purchasing. After that, there are literally thousands of products that can be purchased.
- Electronic databases greatly increase access to information and the implementation must be carefully planned to ensure optimal use of space, money and time (Dickinson, 1994, p. 7).
- To begin an electronic information program, it is not necessary to purchase all the computer equipment the library will eventually need.
- A well-planned electronic resources program will offer CD-ROM, online, hard-disk-resident, and all other kinds of

databases. The size of the library is not a factor. In an extremely small library, all of the above resources can be made available through a single computer.
- Selection of resources must be considered as thoroughly as selection of any other resources added to the library. An electronic resources program is never finished, just as the library collection is never complete.
- A growing, changing electronic resources program will consist of the best choices available at the time of purchase, with an eye for new additions to the program.

Development of electronic information resources

Online databases and services

In January 1979, KFUPM gained access to the world's scientific and technical information through the use of online searching of US databases (Siddiqui, 1996a, p. 3). Since Saudi Arabia was not connected to any international communication network, such as TYMNET or TELENET, at that time, the access was established by using the international telex network. To search US databases, DIALOG and ORBIT search services were selected. DIALOG was selected because it was the world's largest and most comprehensive online information retrieval service with a broad scope of disciplines. ORBIT was selected because it is one of the oldest online services, specializing in patents, materials science and chemistry.

Online searching was upgraded in January 1981, with a low-speed modem (300 bps) through International Database Access Service (a cable and wireless service from London in Bahrain). It was further upgraded in October 1984, using an IBM PC AT with a high-speed concord 224 autodial modem, capable of sending and receiving information at 1200/2400 bps.

The KFUPM Library also has access to nine national online databases produced by the King Abdulaziz City for Science and Technology (KACST) in Riyadh, Saudi Arabia, through Gulfnet (Gulf Network) – the academic research network for Arabian Gulf region countries. Through Gulfnet, the KFUPM

Library, from 1987 to 1995, also had access to BITNET, which provided local facilities for e-mailing, subscriptions to Listservs, and special BITNET/Internet discussion lists. Gulfnet has since been transformed into a TCP/IP network and the KACST databases are expected to become accessible through this new protocol.

The KFUPM Library has provided free online database searching to its users since this service was established in January 1979 because the use of online searching for reference purposes is totally integrated into normal reference operations (Siddiqui, 1991).

Library automation

One of the most dramatic changes in libraries has been the introduction of computers. These electronic information resources have drastically altered the way patrons use libraries. The first step in the direction of library automation of the KFUPM Library was the pre-feasibility study prepared by the data processing center (DPC) in March 1979 (Ashoor, 1983). Consequently, the University administration appointed a task force on library automation (TFLA) to investigate and provide a plan for library automation. The composition of TFLA was a mixture of representatives from the Library and DPC. This marked the beginning of the library automation project.

The immediate task before the TFLA was to recommend a suitable integrated library management system to support various library functions and operations. One of the features that KFUPM Library wanted in the library automation system was the multiple language capability, which DOBIS/LIBIS had for the Latin script languages, German, French and Italian. DOBIS/LIBIS is a software package developed jointly by the University of Dortmund in Germany and the Catholic University of Leuven in Belgium and marketed until recently by IBM. A new company, Extended Library Access Solutions (EliAS), has taken over the rights to develop and market Dobis/Libis from January 1993 (Khurshid, 1994). Dobis/Libis is an integrated library automation system that runs on IBM mainframe computers. The latest version of the software is 3.2. Finally, the TFLA recommended DOBIS/LIBIS in June 1980 with a long-term objective to modify it so it could

handle both Latin and Arabic scripts (Khurshid, 1992a). Later, after initial delays, the DOBIS/LIBIS system was installed in March 1981. The implementation was carried out in three phases:

(1) Phase I: operation of the cataloging and searching modules and conversion of catalog records.
(2) Phase II: operation of the circulation module and interfacing DOBIS/LIBIS with student records and personnel payroll systems.
(3) Phase III: operation of acquisitions module and interfacing DOBIS/LIBIS with the financial accounting system.

The retrospective conversion project was completed in November 1985 and the card catalog was closed a little earlier in March 1985 (Khurshid, 1992b, p. 114). Before closing the card catalog, Computer Output Microfiche (COM), catalogs were produced as a back-up to the online catalog to be used at times when the system could not be available for maintenance or other reasons. In 1987, an Arabized version of DOBIS was developed locally to provide Arabic script access to the library's Arabic collection. Thus, by 1987 the KFUPM Library had achieved the distinction of becoming the most automated library in the Arabian Gulf region and one of a very few libraries in the world to have completed the card catalog into an electronic catalog. KFUPM is one of the few DOBIS/LIBIS user libraries to have implemented the latest version 3.1 (KFUPM, 1998, p. 1).

CD-ROM databases

In July 1991, the KFUPM Library joined the optical disk revolution by establishing a CD-ROM lab near the reference desk with two stand-alone CD-ROM stations, and the following five databases (Siddiqui, 1996b, p. 20):

(1) *ABI/INFORM*;
(2) *Applied Science and Technology Index*;
(3) *Dissertation Abstracts International*;
(4) *NTIS*; and
(5) *Science Citation Index*.

In early 1993 the migration from stand-alone to networked took place. A CD-ROM local area network (LAN) of eight bibliographic databases

was established to give more reliable and convenient multiple-access to CD-ROM databases. These could then be searched simultaneously from the seven CD-ROM stations connected to the LAN. Presently, out of 22 CD-ROM databases (see Table I) subscribed to by the Library, 12 bibliographic databases are networked and searchable from the 15 CD-ROM stations connected to the LAN. In the last quarter of 1993, two CD-Net 428/M servers with 14 drives each were installed to facilitate simultaneous searching of CD-ROM databases by multiple users from the five stations connected to the LAN, thus avoiding the need for changing of discs (Siddiqui, 1996b, p. 27). In 1995, the library was connected to the University's fiber optic backbone, paving the way for campuswide access to the library's selected CD-ROM databases. The first two to share remotely were

the *Applied Science and Technology Index* and *Readers' Guide to Periodicals Literature*.

In November 1995, the KFUPM Library made available its first full-text image database, *Business Periodicals Ondisc* (BPO). In 1996, another full-text image database, the *IEEE/IEE Electronic Library*, was added to the library's database collection. In 1997, three jukeboxes were installed to accommodate more than 700 CD-ROM disks of the *Business Periodicals Ondisc* full-text image databases. The same year two multimedia encyclopedias, *Encarta '97* and *Grolier*, were made available to the public. In 1998, Web-based access to CD-ROM databases was implemented. In 1999, *Britannica* was added. Specialized sources such as *CollegeSource*, the *GCC Economic Database* and *SaudiDirect: Saudi Arabian Companies Directory* were also made available for public use.

Table I List of CD-ROM databases currently subscribed to

Databases

Bibliographic
ABI/Inform (1971-)
Applied Science & Technology Index (1983-1999)
Chemical Abstracts (1996-)
Compendes (1985-)
Computing Archive (1991-1993)
Dissertation Abstracts Ondisc (1861-)
ERIC (1966-)
LISA (1969-)
MATHSCI (1980-)
NTIS (1983-)
Science Citation Index (1987-)
Readers Guide to Periodical Literature (1983-1998)

Full-text
Applied Science & Technology Plus (1994-)
Business Periodicals Ondisc (BPO) (1987-)
IEEE/IEE Electronic Library (1988-)
Readers' Guide to Periodical Literature (1983-)

Multi-media
Britannica '99
Encarta '99
Grolier '97

Special
CollegeSource
GCC Economic Database
SaudiDirect 1997

KFUPM Library Information Gateway

The KFUPM Library Information Gateway represents the first integrated approach to providing Web-based information services to the KFUPM community, and as such its introduction in December 1997 was an important step forward. It is accessible from the university enterprise network (or intranet) at the following URL:

http://www.kfupm.edu.sa/library/libraryhompage/index.htm

The KFUPM Library Newsletter (KFUPM, 1998b, pp. 3-4) published detailed information about the evolving library information gateway. That article highlighted the gateway's purpose, design and development process and its central features. The gateway provided users (faculty, students, staff) access to the online catalog (DOBIS) and the ability to view document sources of basic information on the policies, practices, services and collections the library has to offer. In addition to these resources, the library converted a number of its printed guides and handouts into hypertext mark-up language (HTML), so that users could find out information about library hours, library services, circulation regulations, services and other operations of the library. Overall, the initial structure worked well, and the contents and links were regularly revised and updated to

reflect the dynamic nature of the library home page.

In February 1999, the University established full Internet connectivity. A library home page committee (LHPDC) was constituted to carry forward the redesigning and content development process. The LHPDC is presently focusing its efforts on redesigning the library home page and identifying, evaluating, selecting and organizing Internet/Web resources such as electronic journals, virtual libraries and Internet directories to provide patron access through the library gateway.

Internet and the World Wide Web resources

There is an abundance of Internet resources. Most of the hundreds of thousands of Web sites are available, to use and to link to, at no cost to users. Therefore, Internet resources do not tax library budgets in the same way as do commercial resources. Library Internet collections serve users best through their value-added characteristics that provide intuitive access to a few, high-quality information resources. Two good guidelines (Toub, 1997) for libraries to consider are:

(1) Develop Internet collections which add value to the resources they access.
(2) Develop Internet collections which provide significantly more value to patrons or provide the same value at lower cost than existing collections.

There are two key ways librarians can add value to collections of Internet resources via well-planned organization, navigation, labeling and learning system; and by carefully selecting, evaluating and describing the resources that populate their Internet collections. With the ready availability of hundreds of electronic databases and thousands of Internet resources, it is no longer enough for an automated library system to consist of an online catalog and a handful of citation databases available over a campus network. Rather, an integrated approach is called for to allow access to a broad range of electronic resources through a common interface and to provide sufficient descriptive information online to guide users in the selection of appropriate resources (Caswell, 1997). Large academic libraries have been in the forefront of building the new generation of library systems with components drawn from client/server computing, the Internet, and information standards such as Z39.50. Above all, the World Wide Web has made it possible to build an integrated user interface to electronic resources, which combines descriptive and computer-based training materials with access to a carefully chosen set of bibliographic, full-text, and Internet resources. One outcome of the effort to access CD-ROM applications via a Web browser was a better understanding on the part of reference and other library staff of the limitation of the LAN. Having databases on the LAN is very effective within the confines of the library system where staff have responsibility for the setup of the computers used by the public. However, providing access to the LAN from outside the library requires that users log into the library's Novell server and run the search interfaces from it.

On a campus with highly distributed responsibility for the setup and maintenance of multiple computer platform and network protocols, it is impracticable to provide access to online resources by requiring users outside the library to sign onto a Novell network and use a single computer platform (PCS). Client/server technology, on the other hand, is much more amenable to the wide area distribution of online resources in a heterogeneous computing environment. With the implementation of the Web as the linking mechanism, online resources can be presented and accessed through a single environment irrespective of user platform.

Digital library projects: Arabian Gulf scenario

The Arabian Gulf libraries have to be part of the information superhighway, as the sea of information is knocking at their doors. The Arabian Gulf region has the necessary infrastructure and expertise to meet this challenge and set up digital libraries. Through the Internet it has now become possible to be a part of the "Global village" and exchange and share information instantly. The World Wide Web allows one to explore a seemingly

unlimited amount of digital information. With all these facilities it is possible to access thousands of databases and make information available to the user community in the region. Availability of CD-ROM databases accessible through LANs and wide area networks (WANs) is an added advantage. In fact, some of the libraries in the Arabian Gulf region had earlier initiated a few digital library projects. But it would be worthwhile to actively cooperate and work seriously towards forming a regional digital library network for optimally using the resources, cost, space and time.

The KFUPM Library is presently working on providing campuswide connectivity to its CD-ROM database collection and electronic journals through the innovative use of Internet and World Wide Web technologies. These can be later expanded for external connectivity and usage. But what is important is to plan and design systems in a way that they can be integrated easily later into the national, regional and international digital library networking topologies.

Future plans

The KFUPM Library has always been in the forefront in applying modern information technologies in its functions and operations. The following are some of the areas where the library is taking concrete initiatives in the immediate future (KFUPM, 1998, pp. 4-5).

Migration to a successor system

Since the present system DOBIS/LIBIS does not adequately support the state-of-the-art technologies like the Internet and the World Wide Web, the KFUPM Library administration created a library automation survey ad hoc committee (LASAC) to identify and select a suitable successor system. The chosen system is expected to be compatible with the Internet and World Wide Web and other information technology applications, including comprehensive support for the Arabic script. In this direction, the LASAC has already short listed two systems, HORIZON and UNICORN, which have since been thoroughly evaluated. The final decision in this regard is expected soon.

Up-gradation of infrastructure

The library LAN and CD-NET, which were created in 1993, are also undergoing up-gradation with the objective of providing faster access to electronic resources. Even the computer systems, cabling and hubs are also being upgraded to provide the best possible infrastructure to the users.

Internet Lab

The Library has a plan to provide access to numerous Internet resources to complement the existing collection. A part of the collection, including some journals and CD-ROM databases, may be replaced with their Web-based counterparts. In order for the users to make full use of the Internet and its resources, an area has been designated on the third floor of the library to create an Internet Lab, where powerful PCs with necessary software will be provided.

Conclusions

The KFUPM Library has come a long way in developing useful and qualitative electronic information resources. Right from an early stage, the library planned and successfully implemented a well-designed electronic information resources program and consistently revised it to incorporate new information technologies. The KFUPM Library has the distinction among the worldwide DOBIS/LIBIS users group of having implemented almost all the DOBIS releases (from 1.0 in 1981 to 3.1 in 1995). CD-ROM LAN has become an integral part of the library services. Installation of the CD-ROM Web server has enabled the library to provide information access to a larger user population. The KFUPM Library Information Gateway is being continuously redesigned and restructured to provide access to CD-ROM databases, electronic journals, document delivery services and several other electronic information resources.

The availability of a multitude of electronic information resources has created a greater challenge to the libraries to develop them. It has now become necessary to formulate and execute a well-designed electronic information

resources program. The libraries, including the KFUPM Library, that have already developed and executed such programs are usually willing to share their experiences and expertise with others preparing to enter the world of electronic information resources. With the variety of databases available and the limited amount of financial resources that libraries have, the implementation of electronic information resources program must be carefully planned to ensure optimal use of money, time and space. Finally, it would be worthwhile for the libraries of the Arabian Gulf region to actively cooperate and work seriously towards forming a regional digital library network for optimally using the electronic information resources.

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