

1991

New Information Technology in Puerto Rican Academic Libraries: Potential and Barriers for its Implementation

Daniel Ortiz-Zapata
Debbie Ann Quintana

NEW INFORMATION TECHNOLOGY IN PUERTO RICAN ACADEMIC LIBRARIES: POTENTIAL AND BARRIERS FOR ITS IMPLEMENTATION

Daniel Ortiz-Zapata

University of Puerto Rico Library
Rio Piedras Campus, Puerto Rico

Debbie Ann Quintana

University of the Sacred Heart Library
San Juan, Puerto Rico

Keywords: Information Technology, Academic Libraries, Barriers, Puerto Rico, E-Mail, FAX, Optical Technologies, CD-ROM, OPAC, Microcomputers, Techno-logy Applications.

Abstract: Academic libraries in Master and Doctorate granting institutions were studied to identify current use and future implementation of E-Mail, FAX, Optical Technology, OPAC, and Microcomputers. Private and state institutions were surveyed via telephone or site visits. Library Directors, Key Staff members, and Automation Librarians' opinions on the potential and the barriers of new information technology for Puerto Rico were gathered. These are discussed within the Puerto Rican context.

1. INTRODUCTION

Everyday new technological advances affect the way that information is handled in libraries, documentation and information centers, and archives where information is acquired, processed, and disseminated. Information technology is changing the way people seek information. These and other factors combine to accelerate demands for new information technology upon libraries and information managers.

In every area, libraries have felt the impact of new information technology. Computing technology, communication technology, and mass storage technology are some of areas of continuous development that reshape the way that libraries access, retrieve, store, manipulate, and disseminate needed information to their actual and potential users.

New information technology is a facilitator of the mission, the goals and the objectives of academic, public, school and special libraries around the world. However, implementing the technology has its impact, drawbacks and obstacles associated to specific environments and infrastructures either by geographical location or socio-economic factors. Implementation and use of new information technology as a tool for the above stated purposes may be related to the impact and the obstacles experienced, as well as the perceptions, on its value for information handling.

2. BACKGROUND

Since the mid-seventies academic libraries in Puerto Rico have begun the automation of library functions. These automation attempts have yield uneven results. Further acquisition and implementation of other information handling technology has followed the same patterns as described by Maura (1987a, (1987b), and Griffith, Goshen, and Harding (1984). The almost untouched environment that prevailed before new information technology was implemented in the Island provided an ideal ground for developing integrated systems with uniform cataloguing access and information retrieval.

After 1984 most automation efforts have taken place in different public and private institutions and at different times with varying resources that created an environment where software and hardware incompatibilities have been frequent problems. Most academic libraries have been in need of trained personnel to understand and implement new information technology that satisfied their needs and to promote further development of resource sharing structure in the future. High costs, existing infrastructure, and lack of administrative support during the first two decades of automation have not facilitated successful implementation of information technology in Puerto Rican libraries (Figueras, 1990; Maura, 1987b; Griffith, Goshen and Harding, 1984).

Yet, these academic libraries have played a major role in information technology implementation. Existing public and school library systems have not involved as actively in pursuing new information technology as a facilitator of the two major goals of libraries or information centers: acquisition and access of information. Puerto Rican academic libraries have a significant role in the acquisition and dissemination of information related to our own identity and heritage as well of the information needed for national development. They acquire, store, and access recorded knowledge in many formats necessary to achieve these two goals. Beyond this, academic libraries have the mission of supporting curricular information needs of their clients, providing materials or access to the resources on demand.

3. PURPOSE OF THE STUDY

New information technology used in Puerto Rican academic libraries has been documented in a few studies (See "References" section). The extent on which information technology is used in these libraries is still uncertain. This is more relevant for those institutions that require access to and ownership of primary sources to support basic and applied research and that have in their mission and goals the responsibility of acquiring, storing, accessing, and disseminating the research generated in the graduate schools or programs affiliated to the institution to whom these libraries serve.

With the advances in information technology that we now enjoy, it is foreseeable that the panorama for academic libraries in Puerto Rico will shift toward compatibility for resource sharing rather than for cataloguing purposes. With the addition of microcomputers and main-frames, electronic mail (E-Mail), telefacsimile (FAX), access and retrieval of local and national bibliographic databases and optical technology, the status of these new information technologies in these libraries is still unknown. The overall purpose of this study is to determine the changes that have occurred in academic libraries in Puerto Rico concerning new information technology in the use and implementation of specific technologies not previously documented by other researchers.

In addition, another objective of the study is to identify both the perceived barriers and the potentials associated with information technology use and implementation on the island. Figueras (1990), Maura (1987a), Griffith, Goshen, and Harding (1984) discussed some of the major barriers that libraries experienced during the advent of automation and online searching in Puerto Rico. However, addition information handling technologies have been implemented since these studies, and there is no knowledge whether the experience in the use of these new technologies is similar with that of the use of those technologies included in earlier studies.

Use or implementation of information technology may be deterred by certain considerations or factors related to the perceived value of the technology and with physical or ideological factors. These barriers may be significant and similar to other countries experiencing the impact and demands for new information technology. This study can provide valuable information for information managers locally, and may also assist in developing strategies to cope with these barriers in other geographical areas. The perceived benefits explored in this study of new information technology in academic libraries, as articulated by the Puerto Rican librarians, can be similar to those expressed elsewhere.

4. METHODOLOGY

In order to attain the stated objectives of this study, A total of twenty one libraries were identified. To identify these libraries, *The College Blue Book*, 1990-91 edition, was used. However, some inaccuracies were detected in this list that required creating a list that reflected recent changes in degrees offered at the master and doctoral level in Puerto Rico (See Appendix 1 for a list of participating institutions and degrees offered). From these only seventeen agreed to participate in the survey. Appendix 2 for a list of institutions covered in the interview.

A questionnaire was developed and pretested with three librarians. The questionnaire was redesigned according to their

suggestions. The final version of the questionnaire was used as a guide to conduct the telephone interviews or site visits with current library administrators, automation librarians, or key staff members in the seventeen institutions.

The questionnaire covered all new information technologies of interest to this study. It also included questions on major barriers perceived in implementing and using these tools in Puerto Rican academic libraries. Another topic for discussion included in the questionnaire was perceived advantages and potential of these technologies for these libraries.

Interviews and site visits were conducted during September and October 1991. The length of the interview process and site visits fluctuated from thirty-five minutes to an hour and a half. Interviewees had considerable freedom to express their views as the survey was conducted by colleagues who know each other either through professional activities or other means of acquaintance.

5. FINDINGS

Findings of the survey will be presented and discussed following the structure of inter-views and objectives of the study (See Appendix 3 for a table of Puerto Rican Academic libraries using new information technology).

5.1. E-Mail

Six of the surveyed libraries or thirty five percent (35%) have access to E-Mail. Implementation of this technology is at different levels and stages. Main applications of E-Mail in libraries fall into two activities: teleconferencing and interlibrary loan. The Interamerican University has the capability of E-Mail within its automation. However, it is not been used and there is no plan to use it in the near future. According to people interviewed in those libraries that do not have E-Mail, this technology is not perceived to be needed for implementation in the future. These respondents perceive E-Mail as of marginal interest for the library.

5.2. FAX

Ninety four percent (94%) or sixteen of the respondents said that the library has access or either owns a FAX. Use of FAX concentrates in ILL functions. Use of FAX for acquisitions purposes ranked second, while its use for administrative purposes ranked third. The same percent of respondents plan to add one FAX or more. Librarians felt that FAX was extremely useful and easy to acquire due to its widespread use in other units of their institution.

5.3. Microcomputers

Seventy six percent (76%) claimed ownership of one or more microcomputers. Thirteen libraries plan to acquire more microcomputers. The Interamerican University's Metropolitan Campus owns twelve PCs and plans a LAN (local area network) for CD-ROM searching. Other libraries are evaluating CD-ROM use to expand the number of microcomputers owned. Microcomputers applications ranked first for cataloguing, second for CD-ROM searching, third for administrative purposes, fourth for circulation, fifth for online searching, sixth for indexing, and seventh for desktop publishing. Interviewees felt that microcomputer use will continue to grow as its power and versatility increase while prices decrease. The major perceived advantage of PCs as reported by librarians is their multi-task capability for information handling in the library.

5.4 Optical Technology

Eleven libraries have CD-ROM bibliographic databases. Sixteen different titles are owned by the respondents. All wish to add more CD-ROMs. The leader of this trend is again the Interamerican University's Metropolitan Campus that already owns twelve different CD-ROMs that are used for cataloguing and end-user searching. CD-ROM is perceived by librarians as the major breakthrough in technology when compared to online searching. For a discussion on funding trends for CD-ROM see Figueras (1990). CD-ROM allows users to do their own search resulting in a higher use of the library yielding increase of services such as ILL, while decreasing online searching. A side benefit from CD-ROM implementation is, according to the respondents, is an improved image of the library and librarians. No library, other than the Mayaguez Campus (University of Puerto Rico) owns any other type of optical media. According to Rivera (Personal communication, 1991) the library has no equipment for using this videodisc.

5.5. Automated Library Functions

Seven of the participating libraries, or forty one percent (41%) have an OPAC. All auto-mated libraries acquired vendor systems. Data Research Associates, DOBIS Leuven, NOTIS, and MarcCard are the systems in use in these institutions and their branch campuses on the island. Automation has generated centralized cataloguing units for most private institutions while public universities still keep their cataloguing separately by campus. Automation of library functions differ from one institution to the other. The University of Puerto Rico, the oldest and largest university, is behind in terms of automation when compared with private academic institutions on the island and its own Mayaguez Campus. This main library decided to keep the automated system it acquired in 1984 (DRA) while the rest of the University of Puerto Rico is in the initial implementation stages of NOTIS for the whole state university and college system. The Sacred Heart University is currently evaluating different vendors to determine which will be more favorable for them.

5.6. Online Searching

Dialog, Medline, BRS, Lexis, and Westlaw are online searching services available in fifty three percent of the surveyed libraries. These services are generally offered with cost to patrons through librarian mediated searching. The three libraries with cost free access provide end-user searching in Medline, BRS, Westlaw, and Lexis. Online searching has decreased in those institutions with CD-ROM searching. Online searching was easily adopted by many libraries in Puerto Rico as cost of service was passed on to the users, a trend not followed with other new information technology in the Island.

6. IMPACT, POTENTIAL, AND BARRIERS OF NEW INFORMATION TECHNOLOGY IN PUERTO RICAN ACADEMIC LIBRARIES

6.1. Benefits

Interviewed personnel concurred that new information technology has been beneficial to the library in several aspects. The most frequently mentioned benefits in decreasing order are:

- ◆ Quicker access to information,
- ◆ Higher levels of effectiveness and efficiency in library operations and information handling" ranked second,
- ◆ Increased or higher demands for library service, specifically ILL,
- ◆ Time saving.

Surveyed librarians expressed that technology "changed searching habits" and "increased self-sufficiency of patrons". More concrete benefits of technology are "increased speed of cataloguing", "lower cataloguing backlogs", and the feasibility of applying the existing tech-nology for "other creative and much needed activities such as indexing local newspapers through the online catalog". Library Directors, Automation Librarians, and other interviewees foresee higher compatibility of software, hardware, and more feasible networking through telecommunications, computing, and FAX toward future resource sharing and cooperative collection development on the Island.

Other benefits not affiliated to library service were "improved library image" and "more awareness on the role of the library."

6.2. Barriers

The barriers experienced in the implementation and use of information technology in Puerto Rico and evidenced through the opinions of surveyed librarians were divided. Fifty two percent (52%) perceived the lack of trained staff as an obstacle, while the same percent res-ponded that infrastructure as problem. The major obstacle or barrier toward the implementation of new information technology in Puerto Rican academic libraries is funding. Sixty five percent of the respondents were positive about this when questioned. The last perceived obstacle is the rapid changes in the development of information technology. These changes include the different versions of retrieval software for CD-ROM

searching and OPAC software. Some libraries had experienced difficulties such as "loosing" their acquisitions module when the new version of their OPAC was recently installed. Two Library Directors experienced resistance to change from staff members.

All respondents agreed that administrative support from their institution was the main factor in making automation and other information technologies possible and available in the libraries. Recent policy changes, at high levels, in universities, public or private, incorporating an integrated approach to automation of all internal processes, has facilitated in placing the library more quickly into the main stream of information technology on the island. Funding was considered a major obstacle for information technology. However, the support experienced with universities' administration has been transferred into active search for external funding through grants and other funds for acquisition of new information technology. A spirit of competition permeates among private universities in Puerto Rico. Ownership of OPACs, FAX, and Microcomputers are a symbol of status and a factor considered by students when enrolling in colleges and universities.

Most respondents that complained about infrastructure barriers, perceived these as the obstacles or difficulties experienced due to the bureaucratic nature of the institutions they work at. No librarian was concerned or aware of the cost difference of hardware and software in Puerto Rico when compared to the U.S. No one was aware of the taxes imposed on any electronic equipment imported to the Island. Telephone and other means of communication, considered by Hayes (1990), Griffith, Goshen, and Hardin (1984), Jackson (1984), Paisley and Frierson (1990) among many others, as part of the factors considered as an obstacle for new information technology in many countries is not so for Puerto Rico according to the respondents. Other barriers experienced in Latin American, the Pacific Rim, Africa, and Asia are not perceived as major obstacles in Puerto Rico even when respondents felt that some of this may have some relevance in the Island's context. Cultural or ideological barriers such as religion are not part of the barriers experience according to the findings of this study.

7. CONCLUSIONS AND RECOMMENDATIONS

These findings are similar to other studies conducted in the United States and to the factors mentioned by Jackson (1984), Maura (1987a, 1987b), Figueras, (1990); and Hayes (1990). Matta and Boutros (1989) discuss other barriers that did not appear among the findings of this study. It is possible that the political affiliation of Puerto Rico to the United States eases our possibility of adopting new information technology without the problems that other countries have. However, most hardware and software needs to be adapted to a mainly Spanish speaking population. OPAC's menus and screens are translated, while bibliographic instruction requires some adjustments to facilitate access of new information technology to those with limited proficiency in English.

Information managers must be aware of all implications that new information technology has in their workplace. It is essential to identify possible problems with staff in terms of needed training and resistance to change. Awareness of this barriers may assist in coping with the problem by providing extensive training or using other tools and techniques to solve the problem. The benefits of new information technology as documented, in this and other studies, are many. However, the impact of information technology upon other services in the library should pose areas of evaluation to determine its effects in areas such as collection development where debates upon access and ownership of resources may occur. Resource sharing is a trend that appears recurrently in the literature as a result of the decreasing or fixed budgets that most libraries experience nowadays. New information technology may facilitate this task. Each administrator must develop an implementation plan with a high level of awareness of what technology can facilitate and what drawbacks it may bring. Each library or institution must evaluate its needs before following trends that may not reflect its current and future needs.

Puerto Rican academic libraries experience the same benefits, impact, and barriers when implementing and using new information technology as their counterparts around the world. However, the status of the technologies of this study present a picture of uneven development with an increased use of different applications, software, and hardware. A second study exploring library affiliation, size, staff number, budget, and other variables should be conducted. This may suggest possible correlation among these criteria and information technology implementation and use in libraries.

8. REFERENCES

Griffith, J., C. Goshen, & L. Harding. *Multiple Library Consortium to Computerize Library Services in Puerto Rico: Feasibility Study*. Rockville, MD: King Research and Associates, 1984.

Figueras, C., "CD-ROM as an alternative: The Puerto Rican experience," In *NIT '90: 3rd International Conference: New Information Technology for Library & Information Professionals; Educational Media Specialists & Technologists: Proceedings*, edited by Ching-chih Chen. West Newton, MA: MicroUse, 1990. pp 121-129.

Hayes, R. M., "Implications of the new technologies for libraries in developing countries," In *NIT '90: 3rd International Conference: New Information Technology for Library & Information Professionals; Educational Media Specialists & Technologists: Proceedings*, edited by Ching-chih Chen. West Newton, MA: MicroUse, 1990. pp 173-180.

Jackson, W. V., "Libraries in Latin American society," In *The Library in Society*, Littleton, CO: Libraries Unlimited, 1984.

Matta, K. F. & N. E. Boutros, "Barriers to electronic mail systems in developing countries," *The Information Society* 6: 59-68 (1989).

Maura, M., "Automatizacion de bibliotecas en el sistema de bibliotecas del Recinto de Rio Piedras: Pasado, presente y futuro," Paper presented at the *Semi-annual Meeting of the Puerto Rico Library Association*, Humacao, PR, 1987. (1987a).

Maura, M., "Resource sharing experience in Puerto Rico and possibilities for expanding resource sharing in the Caribbean," In *Proceedings of the Thirty-Second Annual Meeting of the Seminar on the Acquisition of Latin American Materials*. Miami, FL: SALAM, 1987. (1987b).

Paisley, W. & E. G. Frierson, "Increasing the use of CD-ROM for international development: What are the barriers? What are the solutions?" In *NIT '90: 3rd International Conference: New Information Technology for Library & Information Professionals; Educational Media Specialists & Technologists: Proceedings*, edited by Ching-chih Chen. West Newton, MA: MicroUse, 1990. pp 234-244.

Rodriguez, K., "Information handling in selected academic libraries of the Caribbean," *International Library Review* 20: 29-43 (1988).

Vigo, L., et al. "Estudio para el establecimiento de una red de informacion interbibliotecaria en Puerto Rico," *Boletin Sociedad de Bibliotecarios de Puerto Rico* 1: 7-15 (1979).

Appendix 1. List of Academic Libraries Surveyed

Ana G. Mendez Educational Foundation	M Private
Metropolitan University Rio Piedras, P.R. 00928	M*
Turabo University Gurabo, P.R. 00658	M
Caribbean Central University Bayamon, PR 00959	MD Private
Central University Bayamon, P.R. 00959	M Private
Electronic Data Processing College Hato Rey P.R. 00919	M Private

Evangelist Seminar of Puerto Rico Rio Piedras, P.R. 00918	M Private
Interamerican University	
Metropolitan Campus San Juan, P.R. 00936	M D
San German Campus San German, P.R. 00753	M
Interamerican University (Continued)	
School of Optometry Hato Rey, P.R. 00919	D
New York University` Puerto Rico Campus Santurce, P.R. 00914	M D* Private Affiliated and located in the Sacred Heart University
Phoenix University Guaynabo, P.R. 00651	M*
Pontifical Catholic University of Puerto Rico Ponce, P.R. 00732	M JD Private
Sacred Heart University Santurce, P.R. 00914	M *
Saint John the Baptist School of Medicine San Juan, P.R. 00936	M.D. Private
University of Puerto Rico	M D MD JD Public
Mayaguez Campus Mayaguez, P.R. 00708	M
Medical Sciences Campus San Juan, P.R. 00931	M MD*
Rio Piedras Campus Rio Piedras, P.R. 00931	M D JD*

M Master D Doctoral MD Doctor in Medicine
JD Juris Doctor *Site Visit

Appendix 2. List of Institutions Where Librarians Were Interviewed

Library

Evangelical Seminar of Puerto Rico
Rio Piedras

Library
Interamerican University
Metropolitan Campus
San Juan, Puerto Rico

Madre Teresa Guevara Library
Sacred Heart University
San Juan

Library, Center for Puerto Rican and
Advance Studies in the Caribbean
San Juan

Library
Interamerican University
San German Campus

Encarnacion Valdez Library
Pontifical Catholic University
Ponce Campus
Library
Phoenix University
Puerto Rico Campus
Guaynabo

Library, School of Optometry
Interamerican University
Hato Rey, Puerto Rico

Library, Law School
University of Puerto Rico
Rio Piedras Campus

Library
University of Puerto Rico
Mayaguez Campus

Learning Resources Center
Metropolitan University
A.G. Mendez Educational Foundation
Rio Piedras, Puerto Rico

Library System
University of Puerto Rico
Rio Piedras Campus

Caribbean Central University
School of Medicine
Bayamon, Puerto Rico
Library
Central University
Bayamon Campus

Library
University of Puerto Rico
Medical Sciences Campus
Rio Piedras, Puerto Rico

Learning Resource Center
Saint John the Baptist
School of Medicine
Caguas, Puerto Rico

Library
Library Electronic Data Processing College
Hato Rey Campus

Appendix 3. The Use of NIT in Puerto Rican Academic Libraries

Electronic Mail Application

Caribbean Central University	ILL
Mayaguez Campus, UPR	ILL EC
Medical Sciences Campus, UPR	ILL EC
Metropolitan University, AGMEF	ILL
Rio Piedras Campus, UPR	EC
Sacred Heart University	EC

FAX

Caribbean Central University	ILL ACQ ADM
Center for Puerto Rican Studies	ADM
Central University, Bayamon	ADM
Electronic Data Processing College	ADM
Evangelical Seminary	ADM
Mayaguez Campus, UPR	ILL ADM
Medical Sciences Campus, UPRI	ILL ADM
Metropolitan Campus, UIA	ILL ADQ ADM
Metropolitan University, AGMEF	ILL ADM ACQ
Optometry School, UIA	ILL
Phoenix University	ADM
Pontifical Catholic University	ILL ACQ ADM
Rio Piedras Campus, UPR	ILL ADM
Sacred Heart University	ILL ADQ ADM
Saint John the Baptist	ILL ADM
San German Campus, UIA	ILL ADM

Microcomputers

Center for Puerto Rican Studies	CAT IND ONL CDS
Electronic Data Processing College	CAT
Evangelical Seminary	CAT
Mayaguez Campus, UPR	CAT ONL CDS

Medical Sciences Campus, UPR	CAT ONL CDS ADM
Metropolitan Campus, UIA	CAT CIR CDS ONL
Metropolitan University, AGMEF	CAT ONL DKT CIR
Optometry School	CDS IND
Phoenix University	CAT IND
Pontifical Catholic University	CAT
Sacred Heart University	CDS CAT ACQ ADM
San German Campus, UIA	CIR ONL DKT IND
Rio Piedras Campus, UPR	CAT ADM CDS

Optical Technology

Caribbean Central University	CD
Center for Puerto Rican Studies	CD
Mayaguez Campus, UPR	CD VD
Medical Sciences Campus	CD
Metropolitan Campus, UIA	CD
Metropolitan University, AGMEF	CD
Optometry School, UIA	CD
Pontifical Catholic University	CD
Rio Piedras Campus, UPR	CD
Sacred Heart University	CD
San German Campus, UIA	CD

Titles Owned*

ABI Inform	Applied Science & Tech.
Bibliofile	BIOSIS
BIP+	Cancer-CD
CompuClerk	ERIC
Grolier Electronic Enc.	Library Literature
MEDLINE	Micromedics
Psych-Line	Reader's Guide
Ulrich+	US Government CD-Census

*A selective list of titles informed by respondents

Automated Library Functions

	OPAC	CAT/ILL
A.G. Mendez Ed. Foundation	Data Research Assoc.	Bibliofile
Metropolitan University	1984	
Turabo University		
Caribbean Central University	MARC-CARD	
	1992	
Interamerican University	Dobis Leuven	Bibliofile
Metropolitan Campus	1986	
San German Campus		
School of Optometry		

Pontifical Catholic

University	NOTIS 1990	Bibliofile
University of Puerto Rico	NOTIS	OCLC
Medical Sciences Campus	1989	
Rio Piedras Campus	1979	OCLC
	NOTIS	
	1989	
Mayaguez Campus	Data Research Assoc.	Bibliofile
	1984	

Online Searching

	Service	Type/Cost
Caribbean Central U	BRS	End-user
	searching/Free	
Center for Puerto Rican	Dialog	Mediated
Interamerican University	Dialog	Mediated
Phoenix University	Dialog	Mediated/Free
Pontifical Catholic U	Dialog	Mediated
Sacred Heart University	Dialog	Mediated
University of Puerto Rico	Dialog	
Mayaguez Campus	Dialog	Mediated
Medical Sciences	Medline	End-user
	searching/Free	
Rio Piedras Campus	Dialog	Mediated
Law School	Lexis	
WestLaw	End-user	
	searching	
	Mediated/Free	

ACQ	Acquisitions	ADM	Administration
CAT	Cataloguing	CD	CD-ROM
CDS	CD-ROM Searching	CIR	Circulation
DKT	Desktop Publishing	EC	Electronic
			Conferencing
ILL	Interlibrary Loan	IND	Indexing
ONL	Online Searching	VD	Videodisc