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## Public Access at the University of Guelph Library

### Introduction

The University of Guelph is one of fifteen provincially assisted universities in Ontario. Guelph is a medium-sized institution with 10,000 students (1000 of whom are graduate), approximately sixty miles northwest of Toronto. Although it received its charter in 1964, the university was based on the integration of three existing agricultural and veterinary colleges which date to the middle of the last century.

This changed university status and the formation of four new colleges led to the need for immediate acquisition of thousands of monographs, documents and serials. Automated cataloging systems were seen as the only solution to the organization, access and processing problems which resulted. By 1967 the University of Guelph Library staff had designed and implemented separate automated systems for the cataloging and processing of government publications, monographs and serials, and a retrospective conversion of the original college catalogs was completed by 1968.

The central library building on the Guelph campus, the McLaughlin Library, which opened in 1968, now houses 1.5 million volumes in 270,000 square feet. One of the design criteria for the building was automated circulation control, so that automated circulation became an important subset of the Guelph cataloging system, extracting necessary data elements from the Guelph master file of bibliographic records.

### *Previous Batch Circulation System*

This basic circulation system, using punched book cards and patron badges, served Guelph reasonably well from 1968 until 1976; circulation

transaction lists were printed daily, and overdue and fine notices, error and edit checklists, and management reports were produced as required. A simple system to handle reserve book circulation was added in 1973. The data collection terminals were changed in 1972 from IBM 1030s to Colorado Instruments (later Mohawk) C-DEKs, but the original concept of the system was not altered.

#### *Reasons for the Change From Off-line to On-line System*

By 1976 the pressure on the library was considerably greater with 10,000 students than it had been when the building opened for 3000 students in 1968. For instance, in 1976-77 some 500,000 books and documents circulated, while in-library use was double that amount. In addition, the climate of economic restraint that influenced Ontario universities demanded strategies that would reduce or at least hold constant the existing library positions. Knowledge of changing technology led to consideration of an on-line circulation system early in 1976, and a study was mounted to identify specific problems or inadequacies of the existing batch circulation system, and to specify design requirements for a new on-line system. The following inadequacies were identified.

*Mechanical breakdown.* As a result of the transaction load mentioned above, the percentage of errors present in the circulation system increased greatly during 1975 and 1976. This was primarily due to mechanical breakdowns in the C-DEK terminals, which were no longer being manufactured or supported by Mohawk. Each incident of terminal breakdown increased the possibility of incorrect data being recorded.

*Errors.* The C-DEK terminal used a very unsophisticated method to prevent the acceptance of incorrect data (double punch and blank column detection), allowing errors to creep into the system without detection. Staff errors also contributed to mistakes in the overdue and fine notices produced by the circulation system, creating unnecessary friction between library staff and users. In addition, students in increasing numbers had discovered ways to subvert the system, complicating the errors which the breakdowns and staff were causing.

In contrast, current technology for data collection uses bar-coded labels, with an error potential of one in 200,000 reads. This rate can be further reduced by a 10 percent chance of the error matching a correct record; thus, the net theoretical error possibility is one in 2 million. It was felt that adoption of such a system at Guelph would not only eliminate errors but would also stop the subverting of the system by patrons, since the labels are manufactured in such a way that any attempt to remove them results in their destruction.

*Cost and inefficiency.* The library circulation staff had developed a series of checks and counter-checks to compensate for errors present in the off-line system. These checks were very time-consuming and expensive, and put an unnecessary load on an already overburdened staff. The cost of this checking was estimated at \$13,500 annually.

Another area in which inefficiencies were evident was the library's holds procedure. This is one of the most critical procedures performed in the library, requiring manual checking of approximately 1 million books reshelfed each year. This checking was done for the most part by student pages, and the fact that they were part-time and that so many persons were involved magnified the chances for error. Hold requests increased by an average of 50 percent per year from 1972, averaging 4000 requests in the fall and winter semesters of 1975/76.

It was concluded that an on-line system would eliminate the necessity for this manual checking routine at a savings of over \$9000 in staff time annually. In addition, another area of user dissatisfaction would be removed, since the capture of items requested by patrons would be facilitated at the circulation point, before books reached the shelves or were charged from the library.

*Reserve desk.* Use of the reserve book system had increased almost 30 percent per year from the time the library opened in 1968, stretching the capacity of the simple semi-automated system to its limits. It was realized that a more sophisticated system was necessary, not only to maintain efficient service to the students without adding staff, but also to provide the management information necessary to ensure that the reserve service was being responsive to the needs of the teaching program.

In summary, the study concluded that benefits from conversion to an on-line circulation system would occur primarily in three areas: data accuracy, human error reduction, and more effective use of staff.

## Design Criteria

In establishing the design criteria for an on-line circulation system, the University of Guelph Library looked beyond the basic functional requirements of circulation. We envisaged the capability of a single library system, albeit consisting of not necessarily compatible units, with direct access by staff and users alike. We also wanted a system which would have adequate backup procedures and be responsive, at minimum cost, to changing requirements within our own library system.

Based on the early experience with our first circulation system, we emphasized the importance of the relationship between the circulation system and the catalog. The continuance of that relationship was consid-

ered of primary importance, which meant that the circulation records should be a subset of the catalog data base in the Guelph system.

Our previous involvement with a bibliographic utility-centered system, the University of Toronto Library Automation System (UTLAS), also influenced the design criteria. For two years we had participated in the on-line cataloging system at UTLAS, with our catalog records stored on the central system in Toronto. We had found ourselves locked into an inflexible system that responded to needs perceived to be common to the group, but not necessarily meeting specific requirements of the individual library. Discussions of on-line circulation and acquisition systems linked to the central cataloging system but able to respond adequately to local needs and policies were not encouraged. After two years of expensive and frustrating experience, we returned to our in-house systems, determined to remain independent for local processing and to purchase needed bibliographic data from utilities if and when necessary. These philosophical design requirements may be expressed in greater detail. The system must:

1. operate on an in-house minicomputer with adequate backup procedures to ensure continuous operation;
2. provide capability for direct use by the students and faculty, minimizing the involvement of library staff in routine inquiry procedures;
3. provide capability for on-line catalog inquiry as part of the circulation system;
4. be able to interface with other components of the library system, providing an integrated and responsive total library operation; and
5. provide capability for linking with on-line circulation systems and/or catalogs operating in other Ontario university libraries.

These five requirements were most influential in making the final selection of an appropriate system, since no existing on-line circulation system seemed to encompass either the philosophy or power which the Guelph requirements demanded. Essential would be a minicomputer capable of sorting and processing all Guelph files of machine-readable records, irrespective of record format or file size. In 1977 the Guelph library files included:

monographs, including audiovisual materials (films, tapes, etc.) cataloged in a MARC-compatible format—400,000 records;  
 government publications coded using the Guelph Documentation System, which assigns each document a unique, jurisdiction-based document number—270,000 records;  
 maps coded in a locally designed system with a geographic map number—50,000 records;  
 serials which do not circulate but which are wanted for display in any

catalog inquiry system. Guelph serials are classified by the Library of Congress system, and individual issue holdings would need to be displayed for inquiry and management information purposes—10,000 records.

In addition, capability for storing MARC files on-line was considered a requirement for both cataloging and acquisitions functions, and assumed a high priority.

With all design criteria included in a specification document, we received tenders from a variety of vendors. We chose a joint development proposal from a Canadian company, GEAC, because it most closely met our design criteria and would allow us to implement our system philosophy. We felt strongly that a system designed with the involvement of Guelph library staff would allow modifications and changes by that staff with relatively little difficulty, particularly since minicomputer technology was involved. We also felt that without an integrated on-line system, we could not make the anticipated staff reductions without reducing direct services to the user.

## System Design

### *File Design*

Although an efficient on-line circulation system was the primary objective of the design phase, the need for coordination with the cataloging acquisition, serials, and documents systems was an essential aspect of the Guelph design philosophy. For this reason, the design phase began with a study of file structures in bibliographic processing systems in use elsewhere in North America or Europe. Without hindering the circulation function, we hoped to be able to provide integrated access to all the Guelph records in their varying formats, without the necessity of actual conversion to a common record structure.

This objective was met by adopting a method for structuring the files for internal processing similar to that of the DOBIS system, implemented at Dortmund, West Germany, in 1976. This concept disperses the various data elements of each record to different files, and links them with keys, pointers and/or indexes. Thus, personal names from the monograph file, which has a MARC-like structure, are held in the same file as personal names from the Guelph document file, with its simple documentation structure. When displayed on the terminal, names from both files are shown together. If a user or staff member wants to see a complete record, a simple instruction pulls the record together. The call number or document number related to a name (or title, or other data element) reveals to the user whether he is looking at a record for a monograph, document, etc. It

should be apparent that an authority system is inherent in the system, precluding the expensive necessity of creating and maintaining a separate one.

### *Public Inquiry*

The second key criterion in the system design was that of public inquiry or use of the system. University of Guelph Library experience with retrieval systems such as CAN/OLE (Canadian On-Line Enquiry), Lockheed and SDC (System Development Corp.) had indicated that the staff's role as intermediaries was a necessary part of the service. It was agreed that a circulation system which depended on library staff to interpret or assist in access to the Guelph data bases for monographs, serials, documents, and maps, or to files of circulation and reserve system transaction information, would not be appropriate in an environment of financial restraint.

The inquiry module of the circulation system was designed, therefore, with self-instructing display screens which lead naturally or sequentially from one command, instruction or question to another. Each set of functions is displayed as a "menu" from which the user selects the key desired. After locating a wanted title (book or document), the user can move to another set of functions which allows him to determine the location, status and/or loan period for the book, and to place a hold on it if it is in circulation. He may also inquire about his own borrowing record—whether he has books out, when they are due, amount of fines (if any owing), etc.

If the student or faculty member becomes confused at any point in his use of the inquiry terminal, a simple action returns him to the first "menu" or display, which begins the step-by-step instructions again. The actual user functions are described in more detail later.

### *Operating System*

The GEAC 8000 operating system facilitates the processing of bibliographic information by allowing complete variability of field and record structures. All fields in the records are bit-aligned, which means that only that number of bits required to store a particular data element is used. This fact, coupled with the use of advanced data compression techniques, allows not only efficient data storage but also high performance on the terminals. A very rapid response, which is essential for on-line inquiry, is possible because the volume of data transferred in a "mini" is much less than in conventional main-frame computer systems.

Further efficiencies are achieved through the file structure, where only as much data as are necessary to differentiate records are stored in any index entry. The data base management system of the GEAC also contributes to

the essential efficiency of a public on-line system. All data in the system are stored in what GEAC defines as wrapped files. The data definition for each field is stored in what is called a wrapped table. This technique provides an additional level of data security in that a file in the wrapped state cannot be used on any other computer. Data would appear in this instance as a long string of bits. This technique further assists in data management in that a field can be modified in size or changed in definition simply by changing the tables in the field's wrapped table. The next time the file is updated, the change will have been accomplished.

UGLI, the GEAC processing language, is not only a language but also has facilities within it to provide for data base management and the application processors. There are two different operational levels, one for staff and one for patrons. The patron may query the system and perform certain functions, but cannot add data. The staff member may query the system and add or modify data as well as process them.

The maintenance processors produce and accept tapes, provide definitions, create and modify data, and reorganize files. The system creates new records but does not discard old records.

#### *Description of User Menus*

Each terminal in the system offers a selection of functions which can be performed. These are displayed on the CRT in a "menu." The command format is a numeric one, and the display itself indicates to the user how to select a desired function from the menu and how to proceed with each subsequent step or procedure.

### **System Operation, 1977-80**

#### *User Reaction*

The system just described became operational in September 1977, after two months of parallel testing. We began with twenty-six terminals, including six available for public use. The first semester of use was a traumatic experience, for three reasons.

1. We operated without a fail-soft mechanism, i.e., a backup computer, and experienced a variety of problems. For example, a major thunderstorm knocked out our power supply. As a result, we installed a separate power feed.
2. Policies or regulations that we had built into the system, such as refusal to lend a book if a user owed more than a \$5 fine, proved too inflexible on weekends since no staff could collect the money. We had to program in a series of overrides to compensate for hours when only student assistants were on duty.

3. We did not anticipate the enthusiastic response to the public terminals, as students happily abandoned the card catalog and lined up at the six public terminals.

In January 1978 our main computer, the GEAC 8000, arrived, and we transferred our existing library computer, a GEAC 800 on which we had implemented the system, to the fail-soft position. We also switched data input for all other library systems to the new GEAC 8000, so that the 800 was always available as a backup for circulation. This meant that changes could be made to the main system as development of enhancements or new modules continued, with no impact on the public circulation functions.

The positive user reaction cannot be overemphasized. Aside from including the on-line inquiry system in the regular library orientation program, as well as a brochure and publicity campaign, no special training was given. We depended on the display to instruct the students, and this proved quite successful. The terminals are located near reader service desks, so that during most hours the library is open, staff are available if a student is having difficulty "wandering" his badge.

Admittedly, we had a less enthusiastic response from many faculty members, who were resistant to "computers" as a matter of principle. We invited all faculty to come to special seminars, either individually or in department groups, and we volunteered to go to department meetings with a portable terminal. The ease and simplicity of the system soon converted most opponents, and we have had to do few individual faculty sessions.

### *Changes and Improvements*

One of the first things discovered during the initial hectic semester in fall 1977 was that students, in particular, learned how to manipulate the system very quickly, and grew impatient with the screen sequence. By the beginning of the winter semester 1978, concurrent with the switch to the GEAC 8000, we had developed "Version II" of the system. Primarily, this allows the knowledgeable user to page more quickly through the menus, going directly to the function sought. We also added additional "INFORM" messages, so that more than 100 informational messages could be received via the terminal. We improved the filing arrangement, changed the display of the call number, and responded to other consistent user suggestions for the public inquiry mode.

In addition to doubling the number of terminals available for public access in the library, we decentralized access in fall 1979 by linking the GEAC 8000 to the campus Gandalf network. This made the on-line inquiry system available on any of the standard ASCII terminals on campus, allowing a read-only capability of accessing the library file. Response to this option, which we call "remote access," has also been enthusiastic. In

addition, it creates many more potential services, such as remote placing of holds or inputting purchase requests. These functions await further testing of the remote-access module, and the development of adequate security for remote entry to the system.

## Conclusions

Although this has been, of necessity, a brief description of almost three years' experience with public access at the University of Guelph, we have reached many conclusions about the potential for this service, and the implications for library operations in the next decade.

Library users, particularly students, adapt very quickly to a computer terminal system and are able to cope successfully with quite sophisticated user functions. In 1979 a group of fourth-year computer science students at the university did an analysis of the circulation and catalog inquiry system for the library, and concluded that we needed, in addition to more terminals, the title display increased from three to five per screen, and title keyword search strategies combined with subject as a basic key.<sup>1</sup> (The latter we plan to do after the present catalog system is completely converted to the on-line mode.)

We also anticipate little need for any increase in our orientation program, even with the increased sophistication of functions available. The computer-assisted instruction which the sequential menus obviously supply seems to be the best orientation we could provide. Incidentally, the instructions on the remote-access module are presently very detailed for the novice user. We may be able to eliminate these in a few years.

### *Catalog Access—Card, COM or On-line*

In the current controversy over catalog format, the University of Guelph Library has no doubt at all that, for a variety of reasons, there is only one way to go: on-line. We have had complete COM/fiche catalogs dispersed throughout the library as a supplement to the card catalog since 1973. Although they have been used and have some advantages, they cannot replace the card catalog in their currency. Support for this view comes from a recent study at the University of Oregon,<sup>2</sup> which concluded that most students simply will not use multiple files, and a library cannot afford to merge the files frequently enough to offset this problem, or to provide the immediate access of the card catalog.

The on-line catalog allows the user to relinquish dependence on the main-entry-centered card catalog, with its emphasis on standardization. If a minicomputer system (such as that described) allows integration in one access method of records of differing formats, then it is possible to provide

the depth and method of bibliographic description required for each resource format. This is different for books, maps, serials, documents, and archives. Admittedly, the bibliographic utilities are enshrining the concept of standardized, in-depth record formats for all materials. In the long run, however, this is an expensive disservice to the local library user. Knowledge of other library holdings, now accessible from the union data base of the utilities, can be less expensively available through a distributed network.

The on-line catalog also bypasses AACR2 and all its related problems. An opportunity is now before North American libraries to rethink the purpose of the catalog, and to use automation to respond to user requirements.

### *Terminal Numbers and Type*

In addition to commenting on menu and screen formats, the student group mentioned earlier also determined the number and distribution of public terminals which, based on observation of both card catalog and on-line inquiry use, they felt the library should have. The library staff estimated the need for an additional seven terminals (see table 1). These estimates indicate that the total number of library terminals required for a university of approximately 10,000 students is between twenty-three and thirty.

TABLE 1  
NUMBER AND DISTRIBUTION OF PUBLIC TERMINALS

<i>Location</i>	<i>Student Estimate</i>	<i>Library Estimate</i>
Documentation center	2	3
Reserve room	2	3
Science division	4	4
Veterinary science division	2	2
Social science division	2	3
Humanities division	3	3
Card catalog (former) area	8	12
Total	23	30

The library is also considering dedicating at least two terminals to borrower file inquiry only. With this arrangement, students who merely want to know if they have books overdue do not need to be involved with students wanting catalog access.

The impact of the remote-access terminals, some of which will be located in the student residences, may well influence the decisions about

numbers and locations of in-library terminals. Although many more terminals are already on order, a final decision will be made before May 1981, when we remove the card catalog.

#### *Menu Drive v. Command Operations*

It has been suggested that it is more efficient in terms of internal computer operation to have a command-driven rather than a menu-driven system. While this may be true in theory, minicomputer technology makes the issue unimportant. Experience with a command-driven system eliminates it from consideration as a public tool. Cost of training sessions and procedural manuals for staff more than offset the slight benefits which might accrue from a "more efficient" operating system. Again, the quick response possible in on-line minicomputer technology allows the menu-driven system, with alternative options for new or experienced users, to operate without the necessity of library staff intervention or assistance.

#### *On-line Access for All Systems*

The potentials of on-line public inquiry or access in an academic library are tremendous. As indicated earlier, different levels of bibliographic access, with different record formats for different materials, can all be accommodated; so can "on order" information from the acquisitions system, or periodical arrival information from the serial check-in system. Library or campus information, e.g., library hours, borrowing regulations, campus activities, or exam timetables, could form another data base that would be accessible on-line, making the library the focal point for all information on the campus—a position perhaps sought at present, but not necessarily achieved.

#### *Summary*

In a recent article in the *Journal of Academic Librarianship*, Leonard suggested that: "we are not capitalizing upon computer technology's potential to enhance service to library users....Automation [in improving the efficiency of production of the manual card catalog] has been used to enhance technical productivity and not user access."<sup>3</sup> Experience with on-line public access and user inquiry at the University of Guelph Library demonstrates a different and desirable direction for the use of computers in libraries, one which abandons concentration on catalog formats and rules of entry, and adopts as its primary objective improved service to the library user.

## REFERENCES

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