

# Mathematics Research Libraries at the End of the Twentieth Century

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Libraries are special resources in mathematics, and their health is a matter of concern not only to librarians but also to mathematicians. Spiraling journal costs, budget problems, space problems, and the increasing role of electronic media continue to require decisions that affect every aspect of the operation.

In the late 1980s the AMS became interested in collecting data on mathematics research libraries to replace anecdotal information. The overall purpose is to assist librarians and mathematicians to build and maintain the best possible mathematics research libraries in academic institutions. The first AMS survey of mathematics research libraries was conducted in the fall of 1990 (*Notices of the AMS*, December 1991, 1258–1262). As in 1990 the goal of the 1996 survey was to document the state of the system.

The 1996 survey was run in the fall of 1996 and extended into February 1997. As in 1990 the questionnaire was sent to all institutions granting the doctorate in mathematics in the U.S. and Canada. The questionnaire was designed to be filled out by the librarian in charge of the mathematics library, which is defined as the main mathematics collection used by the mathematics faculty and graduate students, whether this collection is housed in a general library or some other structure such as

a science library or branch library. In some institutions there is more than one collection that is important to mathematicians, and rather than combine data it was requested that these collections should be reported separately. The focus, however, is on the main collection in each institution.

The questionnaire was sent to 25 institutions in AMS Group I public, 23 in Group I private, 56 in Group II, 72 in Group III, and to 29 Canadian doctoral-granting departments. The U.S. peer groups are determined by “scholarly quality of program faculty,” as reported in the 1995 publication *Research-Doctorate Programs in the United States: Continuity and Change*. Group I is composed of 48 departments with scores in the 3.00–5.00 range and is further divided into public and private institutions. Group II is composed of 56 departments with scores in the 2.00–2.99 range. Group III contains the remaining U.S. departments with doctoral programs and includes a number of departments that were not part of the 1995 ranking. The response rates were:

Group I public: 23 libraries in 22 institutions;  
22/25 or 88% of institutions responded  
(1990, 85% for all of Group I)

Group I private: 22 libraries in 21 institutions;  
21/23 or 91% of institutions responded  
(1990, 85% for all of Group I)

Group II: 37 libraries in 35 institutions;  
35/56 or 63% of institutions responded  
(1990, 74%)

Group III: 48 libraries in 48 institutions;  
48/72 or 67% of institutions responded  
(1990, 66%)

Canadian: 26 libraries in 25 institutions;  
25/29 or 86% of institutions responded  
(1990, 48%)

In all, this amounts to responses from 156 libraries in 151 institutions, that is, 151/205 or 74% of all

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## 1996 AMS-IMS-MAA Library Survey

The Canadian Mathematical Society participated in the 1996 survey. The questionnaire was written by the AMS Library Committee. Current (\*) and participating retired (†) librarian members are: Nancy D. Anderson\*(co-chair), Carol Hutchins\*, Dorothy McGarry\*, Mary Ann Southern †, Martha Tucker\*, John W. Weigel II †. Mathematician members are: George E. Andrews †, Bruce Berndt\* (co-chair), Felix Browder †, Lawrence S. Husch\*, James Rovnyak †, James J. Tattersall\*, Hung-Hsi Wu\*. Karl Dilcher served as the Canadian liaison.

A copy of the full report on the 1996 AMS-IMS-MAA library survey may be obtained from the Web site: <http://wsrv.clas.virginia.edu/~jlr5m/survey/survey.html>.

institutions. For comparison, the 1990 overall response rate was 138 libraries in 134 institutions, that is, 134/193 or 69% of all institutions.

Some factors should be kept in mind in interpreting results. As in 1990 the survey assumes a local definition of mathematics: in some cases this includes related subjects such as statistics. Data also include 6 depart-

mental reading rooms (1 in Group I public, 2 in Group II, 2 in Group III, and 1 in Canada). An effort was made to get more responses from reading rooms, but we regret that the numbers are too small to report them as a separate group. Reading rooms nevertheless play a very important role in many departments.

The size of the mathematics literature is also a factor in interpretation of results. Compared to the humanities, the mathematics literature is relatively compact and monolithic. Its size and diversity nevertheless come as a surprise to many people.

- In 1996 *Mathematical Reviews* selected articles from 1,629 journals (in 1990, about 1,400), and of these it indexed cover-to-cover about 600 (in 1990, about 400).
- In 1997 there are about 29 purely electronic journals in mathematics or closely related areas. Of these, 22 are indexed cover-to-cover. About 123 journals are offered in both paper and electronic format, and this number appears to be rising rapidly.

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Some of the ground covered in the 1990 survey was not duplicated in 1996. In 1990 there were questions probing characteristics that make a good library. These are the same today. The ideal mathematics library has a deep and broad collection including older and historical materials and complete runs of journals. Mathematicians prize ease of access, ability to browse, and a pleasant environment. Professionalism in the staff and good service are also frequently named by mathematicians as important characteristics of a good library.

In the 1996 survey we have been especially interested in comparisons with 1990. Direct comparisons are complicated by the fact that the Group I population has been enlarged from 39 in 1990 to

48 in 1996. Group I is also newly divided into two subgroups, Group I public and Group I private. In some cases Group I public and Group I private were combined for the purpose of comparison with 1990.

These conclusions stand out.

- Significant numbers of journals are being cancelled (Table 1), and some added. Since the questionnaire did not ask the respondents to note if domestic titles were replacing foreign ones or if titles were replaced with those of equal value, we cannot state the extent to which this trend is deleterious. However, a major reshaping of journal collections is under way, from broadly based collections to those which more closely reflect the specific research interests of various departments. Market forces and inflation are driving cancellations. This is shown most strikingly in Group I public universities and Canadian universities: the former with a net change of -22, due to a decrease in state funding, and the latter with a net change of -46, partly due to the decline of the Canadian dollar. Subscriptions of paper journals in 1996 are down about a quarter from 1990. These data are consistent with data published by Chrzastowski and Schmidt (*Library Acquisitions: Practice and Theory*, 1997), which show an overall drop of 18% in domestic science serial holdings in a national aggregate serial collection between 1992 and 1994.
- Serials budgets are up sharply, but they cannot compensate for price increases. The median for Group I rose 58% from 1990 to 1996. Group II rose 32%, Group III rose 20%, and the Canadians rose only 11% in U.S. dollars. Canadian serials budgets increased 30% in Canadian dollars, but a strong decrease in exchange rates for Canadian currency negated much of the budget increase. Spiraling journal costs have hit smaller libraries especially hard, and a growing gap between budgets of large and small libraries may be a byproduct of the journal cost crisis.
- Demand for electronic journals is modest thus far. There is interest in receiving journals in both paper and electronic format. The numbers for purely electronic journals obtained by subscription, or free but cataloged, are very small. At the same time, 60% of all libraries provide access to free electronic preprints, journals, and other mathematical resources such as e-MATH (Table 2, column (H)).
- The Web-based MathSciNet is popular: after only a little more than a year, already 69% of all libraries report that they have subscribed.
- The median for total number of volumes is up 15%. In terms of numbers reporting space problems, this issue seems to take second place to budget shortfalls. The problem is very

serious for those who have it. Space problems affect about 29% of all libraries: 20% have less than a quarter of their books in other locations, 9% a quarter or more. In a subject that has so much emphasis on browsing and the older literature, a badly split collection threatens productivity and quality of scholarship.

- There is an increase in the number of mathematics libraries that are part of a general library or a science and engineering library. The increase appears across all groups. In Group I this is due to at least one change from a departmental library to a science library, but another effect is the change of population by the 25% enlargement of Group I from 1990. We also note erosion of the numbers of mathematics libraries located in the same building as the mathematics faculty.

There remains, however, a strong correlation of location in the same building with the top-ranked departments: the figure drops from 73% in Group I to 17% in Group III.

- Oversight by a professional librarian remains strong in 1996 as in 1990. There is an increase from 77% to 91% in Group I. Group III also shows an increase, while Group II is down slightly. The decrease from 75% to 65% in the Canadian group must be read in light of the fact that the 1996 population of the Canadian group is significantly larger than in 1990.

Table 1 shows the net change in number of journals from reported cancellations and additions. The median for the Canadian group is particularly striking when total holdings are taken into account. In Group I about twice as many show a negative net change as positive. Group III stands out in a table not included here for the very small number of additions to replace cancellations; whereas the other groups are reshaping their collections, Group III appears to be mainly reducing.

The next table shows electronic products available in the library:

- A. MathSciNet (Web version on the Internet)

Table 1  
Net change in number of journals:  
number added minus number cancelled  
(numbers in parentheses show response rates)

	Group I public (20/23)	Group I private (18/22)	Group II (25/37)	Group III (39/48)	Canadian (21/26)	Total (123/156)
80 to 89	1					1
70 to 79						0
60 to 69	1					1
50 to 59						0
40 to 49						0
30 to 39		1				1
20 to 29	1				1	2
10 to 19				1		1
0 to 9	1	8	3	6		18
-1 to -9	2	2	6	10	2	22
-10 to -19	4	4	4	9	1	22
-20 to -29	1	1	3	4	1	10
-30 to -39	1		1	2	5	9
-40 to -49	4		6		1	11
-50 to -59	1			1		2
-60 to -69		1		4	3	8
-70 to -79			1		2	3
-80 to -89	2			1		3
-90 to -99			1		3	4
≤ -100	1	1		1	2	5
Median	-22	0	-18	-10	-46	-16

- B. MathSci online (component of online catalog, through site-load or consortium arrangement)
- C. MathSci on CD-ROM
- D. Science Citation Index online
- E. Science Citation Index CD-ROM
- F. CompactMath (online version of *Zentralblatt für Mathematik*)
- G. Campus network including some of the above products
- H. Access to other electronic sources in mathematics (such as preprints, electronic journals, e-MATH)

Table 2

Electronic products

	A	B	C	D	E	F	G	H
Group I public	19	4	14	5	11	1	5	18
Group I private	20	3	11	4	11	2	4	19
Group II	25	4	14	5	15	3	4	23
Group III	23	3	11	15	14		2	23
Canadian	21	3	8	1	9		3	10
Total	108	17	58	30	60	6	18	93

Over all groups, 69% report use of (A) MathSciNet (Web version) as compared to 37% for (C) the CD-ROM version; 11% have (B) the online version through a site-load or consortium. Only 3% subscribe to (F) CompactMath.

Group III and Canadian institutions are most affected by lack of electronic access; an exception is that the larger libraries in Group III are more likely to have products like (D) and (E).

Comparisons with 1990 are not so easy to make, because the electronic scene has been in such a state of change.

- Already in 1990 most libraries had their catalogs online; asking this question in 1996 did not seem worthwhile, as the practice now is essentially universal.
- Availability of electronic media from faculty offices was an issue in 1990. We conjecture that the nonresponse to our questions in this area means that this is not an issue in 1996; that is, access is widely available to faculty who desire it.
- MathSciNet did not exist in 1990. In 1990 only 28% reported some version of MathSci available in-house in the library; 62% had MathSci available via a vendor. Today having some version of MathSci is on its way to becoming universal in Group I and the Canadian institutions, but Groups II and III lag in this area.

The full report on the survey includes many additional tables and should be consulted for detailed information.

**Note:** A version of this report is also being published in the November 1997 *CMS Notes*.