ABSTRACT
                This report describes a three-stage catalog use study
conducted at the University of Wisconsin-Stout from 1982 through 1986
to determine the types of searches conducted and search success rates
for both the card and online catalogs during the library's transition
to the DataPhase Automated Library Information System (ALIS). Phase
I, conducted before the introduction of online access, developed a
baseline for future comparison; Phase II studied search type, search
success, and use for both catalogs; and Phase III, conducted after
the removal of the card catalog, concentrated on online catalog use.
Data were collected by means of interviews with users for all three
phases. Major findings include: (1) a majority of users performed
subject searches rather than known-item searches; (2) virtually the
only search types used were author, title, and subject; (3) use of
the Library of Congress Subject Headings guide as part of the search
strategy increased for online searchers; (4) use of online
circulation information increased from Phase II to Phase III; (5)
previous computer experience had no effect on users' success rates
with the online catalog; and (6) Phase II users preferred the online
catalog. A 16-item bibliography is provided, and 15 graphs depicting
study results are appended. (KM)

ABSTRACT

A three stage catalog use study was conducted at the
University of Wisconsin--Stout, Menomonie, Wisconsin over
the period 1982 to 1986. Data on types of searches
conducted and search success rates were collected for both
card catalog and online catalog use during the library's
transition to the DataPhase Automated Library Information
System (ALIS). Major findings included the following:

- A substantial majority of users chose to
  use subject searches rather than known
  item searches at all stages of the survey.

- Traditional search types (author, title,
  subject) have remained virtually the only
  ones used inspite of the availability of
  new access points in the online catalog.

- Patrons' use of the Library of Congress Subject
  Headings guide (the "Red Books") as part of
  their search strategy in the online catalog
  increased from the 1984 to the 1986 study. Card
  catalog users, on the other hand, rarely
  used this tool.

- Use of the circulation information (showing
  whether the item sought was checked out, on the
  shelf, etc.) in the online catalog increased
  from the second to the third stage surveys.
  Use of the bibliographic information declined.

- The factor of user's previous experience with
  computers had no effect on success rates in
  the online catalog.

- In the 1984 survey, when both card catalog and
  online catalog use were studied, users showed
  a preference for the online catalog.

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Phase I

A three phase catalog use study was conducted in order to analyze use patterns as the library changed from a traditional card catalog to an on-line catalog. The purpose of the research was to identify ways that a particular clientele used a library catalog, noting changes over time. The primary goal was to evaluate the effectiveness of the online catalog in comparison to the card catalog in terms of user perceptions, of search success and ease of use. On a practical level it was hoped that the study would yield information about ways to enhance the catalog and teach its use in our library instruction program. The study's first stage in 1982 measured use of the card catalog before introduction of any online access in order to establish baseline data for later comparison with online catalog use statistics. Specific objectives were to identify the level of use of the various search options (known-item vs. subject searching), to determine search success rates and to measure the length of time spent for searches.

Phase II

A DataPhase ALIS II library system was installed in stages beginning in the summer of 1982. At the time of the second phase of the catalog use study in 1984 circulation and cataloging functions were fully automated with all of the cataloged collections included in the file, retrospective conversion having been completed earlier. Ten terminals were available for the public to search using a search function called Inquiry. Inquiry is designed for staff use, having no online instructions or help screens and providing bibliographic information in the form of brief citations or the complete MARC format. Although the software for a user friendly public access version had not yet been developed, the library introduced this preliminary version of the online catalog to the university community through the bibliographic instruction program, written instructions, and staff assistance. Six terminals were located in the Reference area adjacent to the card catalog. The second phase of the study was administered to searchers at these terminals as well as card catalog users. In addition to repeating the questions about search type and success measured in the previous phase, the Phase II study also measured the relative quantity of searchers choosing each of the two catalogs and identified attitudes towards the ALIS catalog as well as problems encountered in using it.

Phase III

By the time of the third phase of the study in 1986, the evolution of the online catalog had brought major changes in catalog access at Stout. The ALIS Public Access Catalog (PAC) function, a search function with help screens, had been in use for about a year and the card catalog had been removed. In addition to the traditional author, title and subject search capabilities, the PAC opening menu offered searching by author/title and author/author combinations, call number, a limited form of boolean subject searching, and ISBN number.

METHODOLOGY

For the first phase of the study survey, questions were developed and a trial run was conducted to determine whether to use a written questionnaire or an interview technique. Results of the sample indicated that more accurate responses would be secured using interviews. An interview schedule was set up to include morning, afternoon, evening and weekend hours covering at least five days each week during a four week period in April, 1982. Irterviewers approached catalog users as they left the catalog. Subjects were asked if they would answer a few questions on their use of the catalog. The interviewers recorded their answers and any comments about the catalog or the library that were made during the interview.

The two subsequent phases of the study, modelled on the Phase I design, were conducted at the same time of year and used the same information gathering technique. The questions asked in the Phase I questionnaire became the core of the survey each year and additional questions were added in the second two phases as staff identified specific questions about online catalog use that required investigation. The additional questions lengthened the interview sessions and caused a decrease in total respondents in each succeeding phase. 422 users participated in Phase I, 323 in Phase II (226 online catalog, 107 card catalog), and 289 in Phase III. Results were tabulated by the campus academic computing center using NPERC, a locally developed program that tallies frequency counts and percentages. Cross tabulations were made for the following variables: user status (under rad, graduate student, faculty or academic staff, other staff, visitor), type of search made (subject, author, title), method of introduction to the computer catalog (library instruction, written instructions, staff assistance, etc.) (second two phases), and prior experience with computers (third phase only).

RESULTS

Data collected in the initial card catalog phase of
the study indicated a preponderance of subject searching.
75% of the searches of the total sample and 80% of
searches conducted by undergraduates were subject
searches. It was also found that subject searches took
more time than known-item searches, with only 16% of the
respondents reporting that their search was completed in
less than one minute, as compared to 68% of known item
searches. This finding could have implications for the
number of terminals needed.

Subject Searching

The high proportion of subject searching was of
particular interest because it was in this area that the
online catalog was expected to differ the most from the
card catalog. First, in the card catalog, author, title,
and subject entries were interfiled. The online catalog
represented a change from a dictionary to a divided
catalog in which searchers would have to specify what kind
of search they wanted to do through the codes A for
author, T for title, S for subject, etc. Limiting a
search to the subject index would eliminate titles
matching the search terms. Of course the title index
could also be searched for a subject term, but this would
be done as a conscious search strategy [and would
eliminate an element of serendipity]. Second, two new
search strategies, term truncation and the ability to
search subject subdivisions as well as main headings would
also be offered. Third, at this stage the online catalog
lacked the see and see also references found in the card
catalog. In this situation, it was more important for
users to know an exact Library of Congress subject heading
than before and to be able to type it accurately. Errors
in punctuation, spacing, or spelling were likely to yield
a "No match found" message.

Findings for the two subsequent phases of the study
revealed a consistently high percentage of subject
searching (Fig. 2). However, there were wide variations
in the success rate of subject searching over the three
phases. The percentage of subject searchers who reported
finding no matches to their search term fluctuated from a
high of 31% (1984 online catalog) to a low of 9% (1986
online catalog) (Fig 3&4). Failure rates in the card
catalog were more consistent; 16% in 1982 and 21% in 1984.
The high failure rate for the online catalog in 1984 was
probably caused by a combination of factors, including the
relative inexperience of patrons in using online catalogs,
the lack of an online see reference structure, and the
chan- from a dictionary to a divided catalog. Comments
recorded in the 1984 survey reinforce the idea that many

subject searches in the card catalog were actually
performed in titles:

> There should be more subject headings
> other than Library of Congress as in
> the card catalog. (Only Library of
> Congress headings were included in
> the card catalog).

> In the card catalog, I find much
> more information and I even use the
> same subject heading that I used in
> ALIS.

> There are more topics in the card
> catalog.

Part of the sharp drop in subject search failures
reported in the 1986 survey might be attributed to
increased education of users in the use of the Library of
Congress Subject Headings list, the "red books." A
question asking subject searchers whether they had used
this reference in their searching was added to the survey
in 1984 and 1986 in an effort to measure the impact of the
library instruction program in online catalog use.
Instruction librarians made this a key point in both
written and classroom instruction on online catalog use.
Their efforts appear to have made a difference since 34%
of ALIS subject searchers as opposed to only 4% of card
catalog subject searchers reported using the LCSH in the
1984 survey. The figure increased again to 42.5% in the
1986 survey (Fig. 8).

Known-Item Searching

In addition to the library instruction effort, the
factors of the new public access software and increased
experience with the online catalog were likely
contributors to the higher success rates in the 1986
survey. These elements would be expected to improve
known-item searching as well as subject searching. The
success rates of known-item searches did in fact show
considerable improvement in 1986, when the precentage of
respondents reporting finding no match was 15%,
corresponding closely to the figure of 17% for the card
catalog in 1982 and down by almost half from the 1984 ALIS
figure of 28%.

The decline in search success rates, particularly for
known-item searches, in the card catalog in 1984 as
compared to 1982 (Fig. 4) was not anticipated. Some
search failure can be attributed to collection failure
rather than catalog failure. That is, no items are found
in response to a search term because the library does not

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own anything under the given heading. The representation of collection failure in thi sample might be expected to be higher than normal because 20% of the users reported in answer to another question that their reason for using the card catalog for this search was that they had already tried ALIS with no success. The change could also reflect the redirection of library resources toward the online catalog. The demands of implementation and maintenance of the online database had required closing the card catalog and filing cards for new titles in a separate supplemental catalog. Only a minimum of file maintenance was continued in the card catalog as cataloging personnel turned their efforts to online catalog needs. The library instruction program also discontinued education in card catalog use and concentrated its efforts on searching the online catalog.

User Preference

Since the 1984 phase of the study measured use of both the card catalog and on-line catalogs side-by-side, additional questions were asked to determine user preferences. Prior to conducting the survey, counts of users at the card catalog and online catalog were taken at random half hour periods. This count indicated that the relative traffic at the two catalogs was three online catalog users for each card catalog user. This preference for the online catalog was echoed by 79% of the ALIS respondents to the question "Which catalog do you prefer?" Forty percent of the ALIS users stated that they never used the card catalog anymore. This finding was consistent with staff observations that many users, upon finding ALIS down on occasion, would postpone their catalog use until the online catalog was available rather than using the card catalog. Most frequently mentioned reasons for choosing ALIS were "ALIS is faster" and "ALIS is easier to use." It is interesting to note that users had the impression that "ALIS is faster" although their responses to questions about how long their searches took actually showed that card catalog searches were completed in less time.

The card catalog users included a significant number (42%) who had never used ALIS. Of those card catalog users who had used the online catalog, 58% preferred the card catalog, citing their familiarity with it and its ease of use most frequently. Thus each of the two catalogs had its own group of defenders and its core of users (interestingly, about 40% for each catalog) who used it exclusively.

Use of On-line Catalog Features

There were also a few questions included in the 1984 and 1986 ALIS surveys to measure use of some of the special features offered to online searchers. Responses showed that the use of circulation status information, i.e. an online notice that the item searched is currently checked out or on the shelf, increased between 1984 and 1986 (Fig. 10). 52% of the sample used this feature in 1984 and 77% in 1986. In contrast, the number who reported using the bibliographic information screen decreased sharply. In both the 1984 and 1986 versions of search software, the complete bibliographic information was accessed as an additional level of the search after brief citations had been viewed. The 1984 version of this screen was the MARC record with all field tags included. The 1986 version was a labelled bibliographic record showing only the information typically included on a card catalog card, except omitting the call number. (The call number was now found only on the circulation information screen.) In 1984, 33% reported using the bibliographic screen. In 1986, the figure was 7%. Since the bibliographic screen is the only place where the physical description, notes, and added entries including subject headings are displayed, this finding would be very interesting if it proved consistent over time and through future software modifications. The value of various elements of descriptive cataloging has been questioned in the past. If online catalog user behavior could provide data showing which information in catalog records is actually used, this could provide a meaningful rationale for changing cataloging practice.

In 1986, an additional demographic question asking what previous experience the user had had with computers was included. The responses revealed that almost one-half, 49% of the sample, had no experience using computers other than the online catalog (Fig. 15). This group was compared with the total group and with subsets of users who had particular types of computer experience such as use of microcomputers or the campus academic computer. The results showed that there were no differences in levels of search success dependent on this variable.

On-line Catalog Problems

Both the 1984 and 1986 online catalog surveys asked users what problems, if any, they had using the catalog. In both years the answer checked most often was "None." Fifty-nine percent reported having no problems in 1984 and 45% in 1986. Of those who did report problems the most frequently mentioned were specific software "bugs" (repeating screens in 1984, pageback malfunctions in

1986), mechanical difficulties with logging on and correcting typing errors, and subject searching. Subject searching problems were also mentioned in the general comments section of both surveys. The difficulties reported with subject searching confirmed the concerns of the library staff. At the time of both online catalog surveys, there were acknowledged authority control problems in the bibliographic file as the records had not yet been submitted to a complete AACR2 authority change. The lack of the see reference structure in the online catalog also added to the difficulty of searching. These factors seemed especially troublesome in the subject file, where menus were long and the search software often made it impossible to return to the menu screen after viewing a specific record. Subject searching is the area in which the online catalog seems most in need of enhancement. Automated authority control is in the developmental stages in most online systems. Some have addressed the problem by providing keyword access.

Library Instruction

In the absence of authority control or keyword searching, our approach has been to emphasize subject searching in library instruction. The program apparently has helped users to overcome some subject searching problems. Cross tabulations showed that users who reported learning to use ALIS in a class by a librarian also reported higher rates of use of the Library of Congress Subject Headings and lower failure rates for subject searching than the sample as a whole. This subgroup also had a higher percentage reporting no problems in using ALIS (57% for those who learned to use ALIS in a librarian-taught class compared to 45% of the whole group and the 35% of those who learned on their own or from a friend).

While the library instruction program seemed to have an impact on searching, the effectiveness of online instructions is difficult to evaluate. It is interesting to note that the new access points (author-title and author-author combinations, boolean subject searching, call number searching) were not used by patrons although they are listed on the public access introductory screen, and help screens are provided for their use. This might be explained simply by the fact that users are not familiar with these options. But the use of the LCSH also had not been a standard part of search strategy in the card catalog and it did grow significantly, suggesting that the library's instruction program had a greater impact on search strategy than did online instructions. (For various reasons, the new access points were not taught as part of library instruction).

Similarities with other catalog use studies.

Some of the results of this study were consistent with the findings of a number of other catalog use studies. The predominance of subject searching has been reported in a number of studies of on-line catalog use (Markey, p.78). Because this is a departure from the findings of older studies of card catalog use, some have suggested that it is a peculiarity of on-line catalogs. However, in our case subject searching also predominated in the card catalog, both before and after the introduction of the online catalog. Unfortunately, catalog users also have been found to express more problems with subject searching than other kinds of searching (Markey, p.78). Librarians at Stout expected user dissatisfaction with subject searching, perhaps at even higher levels than it appeared because of the "known bugs," cumbersome software, lack of a syndetic structure and limitations of the database (spelling, spacing, punctuation, etc.) that were unique to our particular catalog during the survey period. However, the findings of other studies show that our situation is common, regardless of the type of online catalog involved. Markey reported that subject searching was difficult for users on all systems studied at six focused-group interview sites (p.82). These catalogs featured different combinations of keyword access, online instructions, term truncation, and other search aids. One factor that increased success in subject searching at Stout was the use of the LCSH as part of the search strategy.

Users preference for online over card catalogs has been widely reported (Markey, Moore, Kranich). At Stout, this preference was demonstrated in the second phase of the study when card catalog and online catalog users were both surveyed. Preference for the online catalog was demonstrated both by users "voting with their feet" in choosing to use the online catalog by a 3 to 1 margin and in stating this explicitly in answer to a survey question.

Limitations of the study and suggestions for further research.

The measure of subject search success in terms of the number of citations retrieved gives an incomplete picture of a complex transaction. Two dimensions of this process that were not adequately measured by the study are precision, that is, the appropriateness of specific citations retrieved, and the element of time.

One of the questions asked in each stage of the study was how long searches took (Fig 5-7). Data collected showed the predictable finding that subject searching was

considerably more time-consuming than known-item
searching. This was true in both the card catalog and
online catalog and was consistent throughout the three
study stages. Although the question was designed to
reveal how long it took a patron to complete a search on a
single search term, the researchers felt that some
respondents answered in terms of the total search session,
during which they may have entered several related search
terms. In the 1986 survey, the question was divided into
two parts in order to clarify this point. However, there
was still some doubt whether the question was understood.
In the online catalog, a search on a single term can take
several discrete steps, each requiring separate
keystrokes. Strategy can be modified as the search
proceeds. This dynamic quality makes it difficult to
distinguish when one search ends and another begins during
any given session. The question of length of time of
searches has implications for queuing and the number of
terminals needed for patron use. This information can
probably be obtained more effectively by queuing studies.
Two studies of terminal use were conducted at Stout during
1983 and 1984. These investigations measured the average
number of users per hour for each terminal in the library,
the total number of users at each terminal, and the number
of users at the card catalog. The data identified the
terminals with the highest and lowest use, showed
increased use of terminals from 1983 to 1984, and revealed
a higher percentage of patrons choosing the online catalog
over the card catalog than the 3 to 1 ratio reported in
this study.

Another limitation of this study method is the
reliance on the memories and candor of people questioned.
There may be a tendency on the part of people questioned
to give answers that they think will please the
interviewer or demonstrate their own competence. There is
also no measure of the reasons for search failure.
Searches that result in "no match" could be the result of
spelling errors, inadequate subject headings, or the lack
of material in the collection, just to name a few
potential problems. The success rate of searching is
actually a measure of a composite picture of user skill,
catalog effectiveness, and collection adequacy. One way
to obtain more specific information about catalog searches
is through transaction log analysis (Stout's ALIS system
does not have this capability). This automatic monitoring
of searches would provide data to measure keying errors,
spelling errors, the types of searches, number of matches,
amount of use of online help screens, and other purely
quantitative factors.

SUMMARY

Through the four year transition period from a
dictionary card catalog to an online public access
catalog, the types of searches and relative percentage of
each remained consistent, with subject searching
predominant. New search strategies such as call number
searching, ithor-title combination searching and boolean
subject sex.-ching have not been adopted in significant
numbers. However, the new features of online circulation
information and online instructions are used.

Online catalog search success rates were not as high
as those of the card catalog initially, but improved over
time, to the point where the highest search success rates
were recorded in the most recent online catalog test
phase. When both the card catalog and online catalog were
available for use, patrons expressed preference for the
online catalog. While acceptance of the online catalog
has been high, dissatisfaction with subject searching has
been expressed. A concerted effort by the library
instruction program to teach the use of the Library of
Congress Subject Headings had a positive impact, but the
lack of a reference structure and software problems with
subject searching remain.

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Appendix

In all stages of the study, undergraduates made up more
than 75% of the survey sample. The numbers of other categories
of users were not large enough to obtain meaningful data on
how their catalog use differed from that of undergraduates.

User status 1982 (CC)
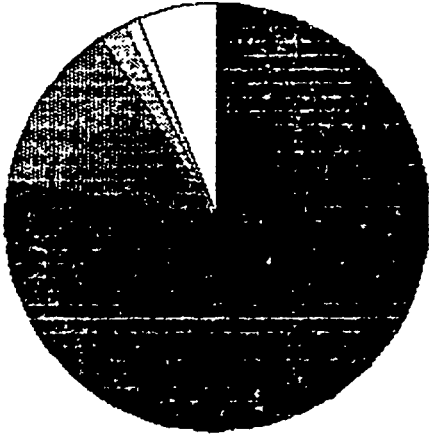
User status 1984 (CC)
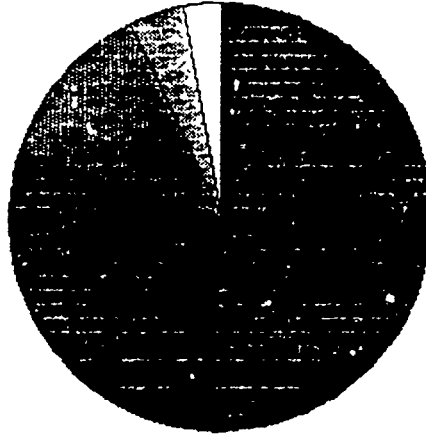
- undergrad
- grad
- fac/staff
- other staff
- visitors

User status 1984 (ALIS)
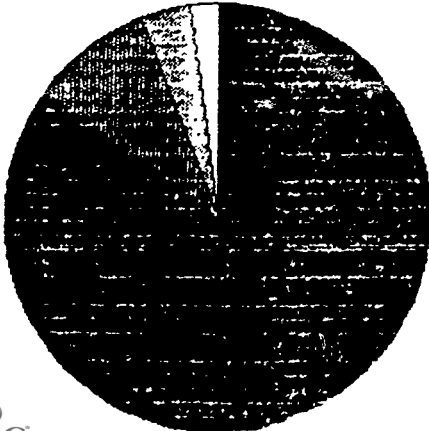
User status 1986 (ALIS)
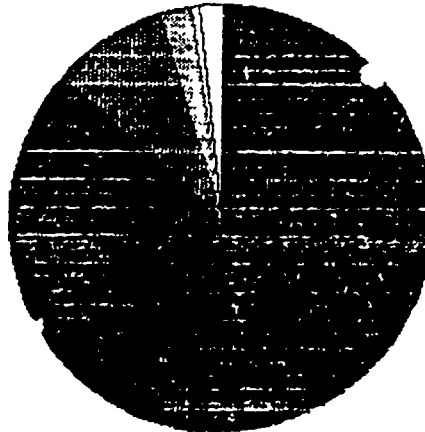
Type of Search [fig.2]
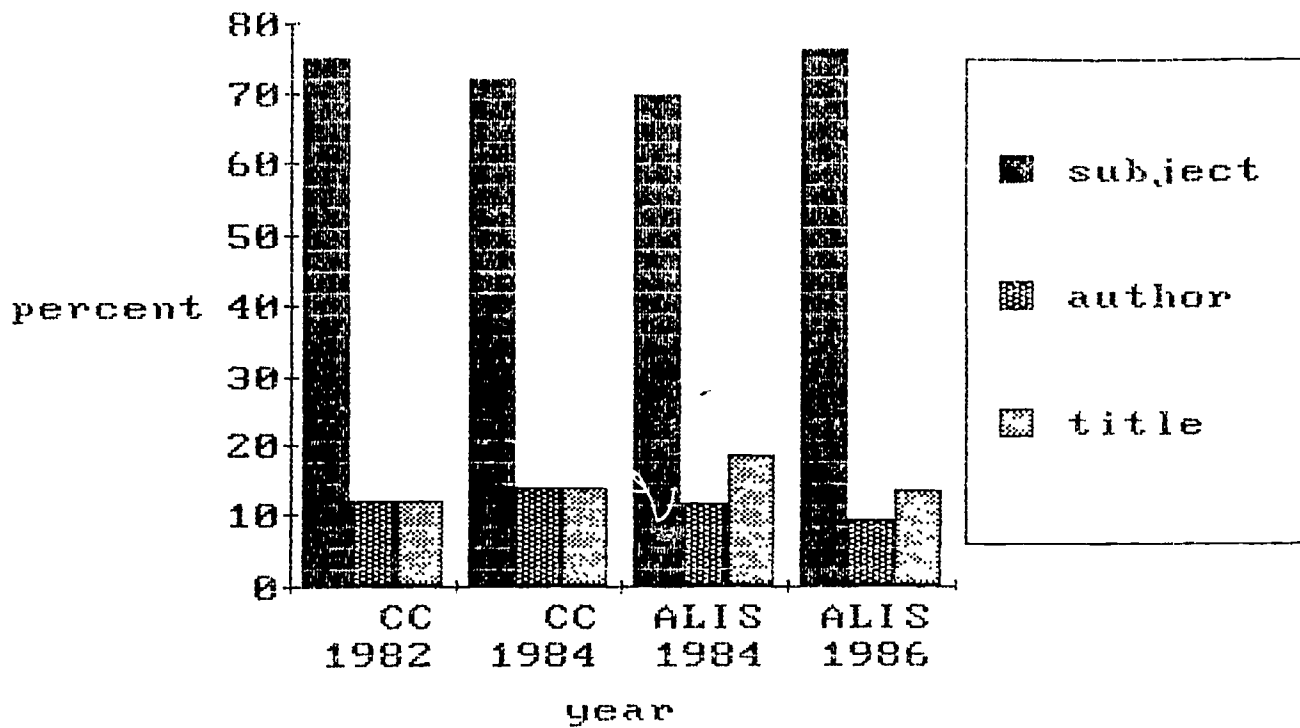
The high proportion of subject searching remained
constant throughout all survey phases.

Subject Search Success [fig.3]
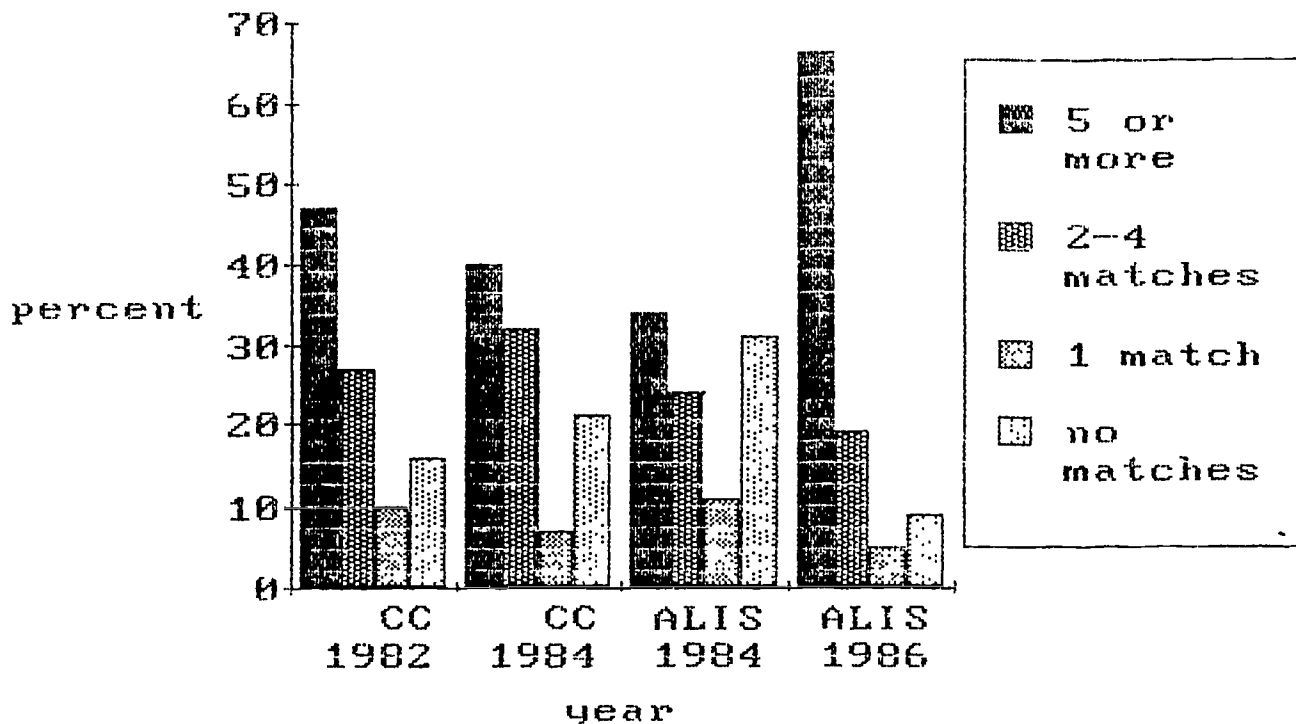
Initially, online catalog users reported less search success than card catalog users. However, the online catalog figures for the most recent survey show the highest levels of search success as measured by number of citations matching the search term.

Subject search : No matches
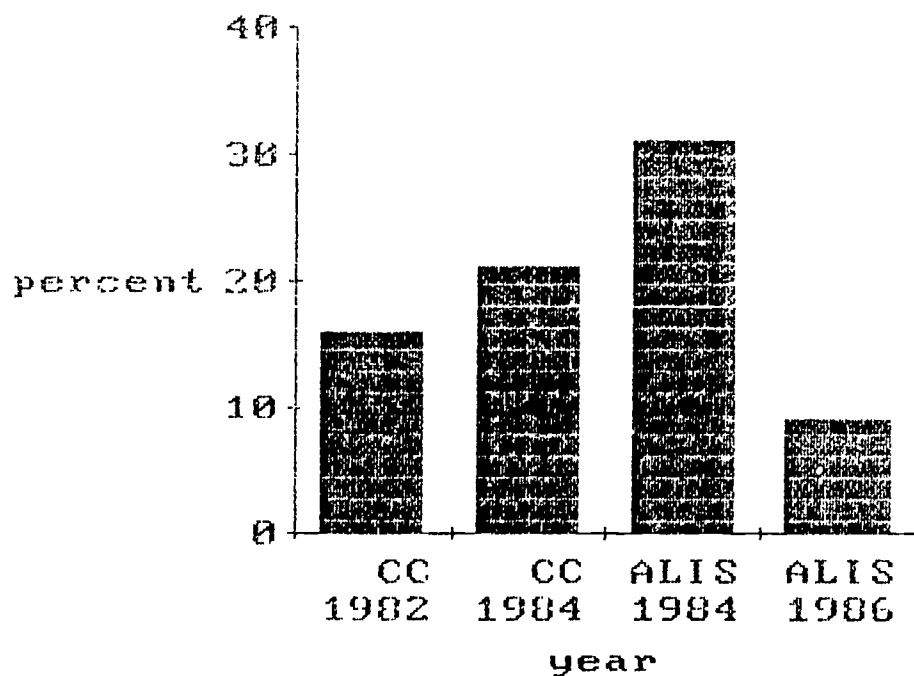
Search success may also be shown by the measure of its opposite, search failure. The level of searches yielding no matches increased in both catalogs in 1984, but decreased to a low in the online catalog in 1986.

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AUTHOR/TITLE SEARCH SUCCESS
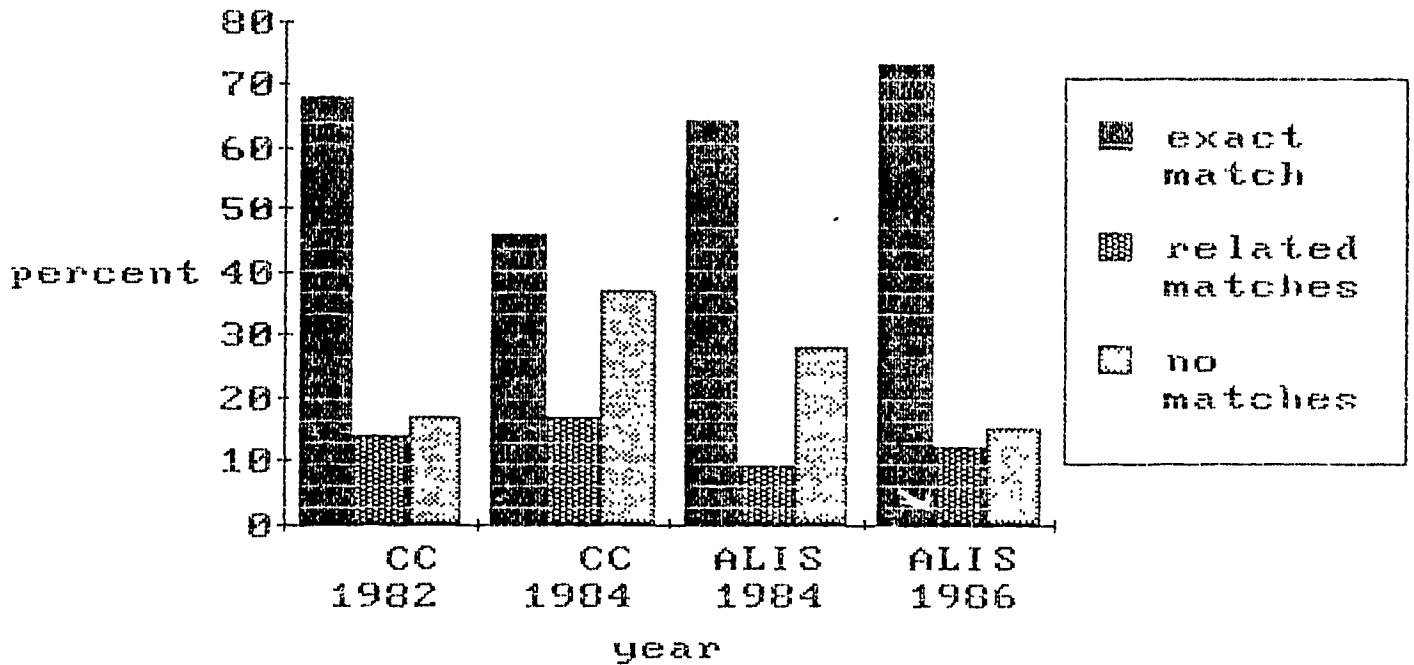
(Fig. 4)

Known item search success patterns paralleled those seen
for subject searching. The transition year of 1984 showed declines
in search success, but 1986 performance showed the highest levels
of success.

(Fig. 5)

Length (time) of searches for subject

Legend:
- .1-.9 min.
- 1-3 min.
- 4-5 min.
- 6-10 min.
- 10+ min.
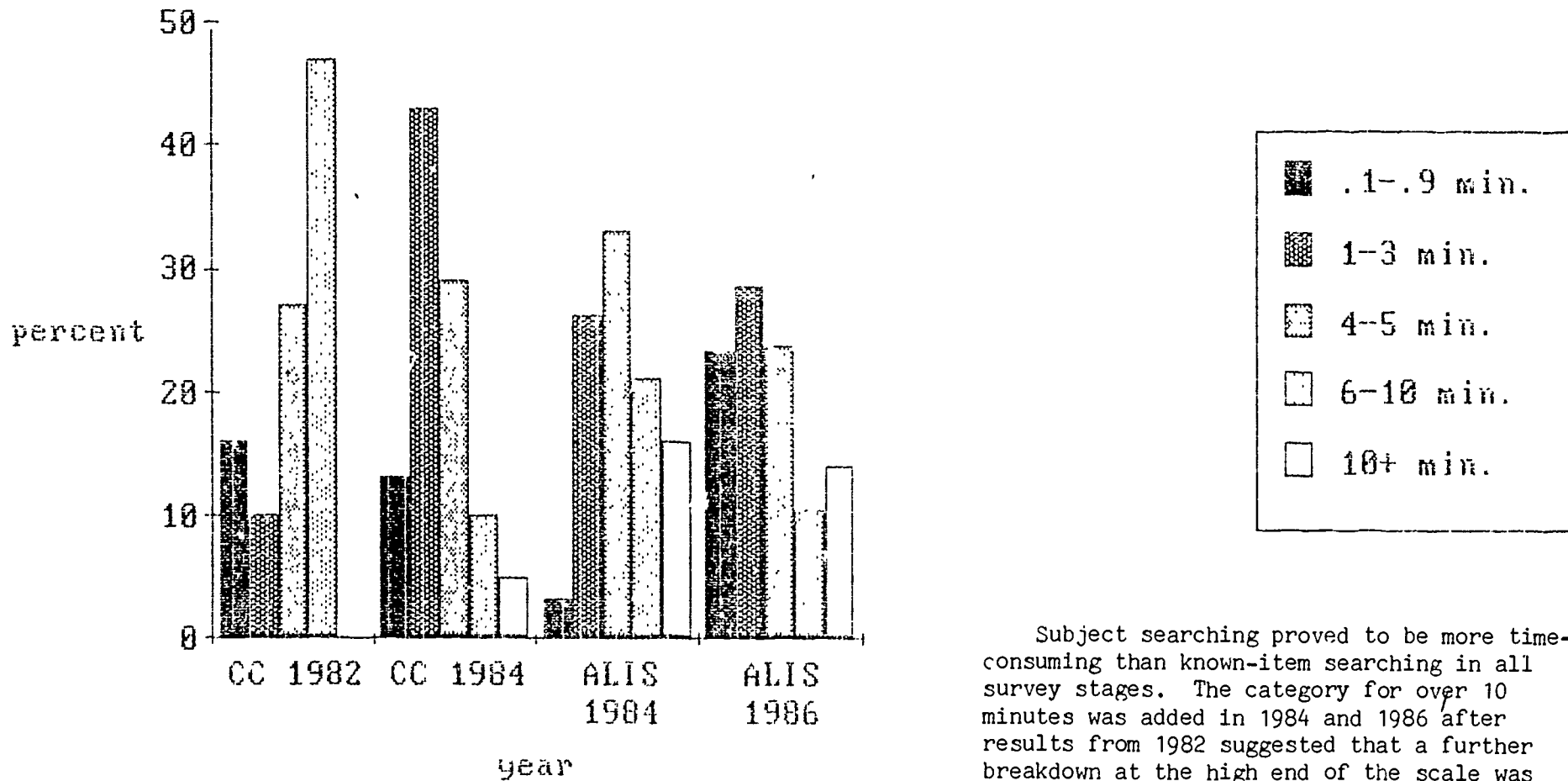
Subject searching proved to be more time-consuming than known-item searching in all survey stages. The category for over 10 minutes was added in 1984 and 1986 after results from 1982 suggested that a further breakdown at the high end of the scale was needed. Part of the decline in time spent on subject searches in 1986 was due to the addition of a question asking the length of the total search session as opposed to the subject of this question, which was the time required to search a particular term.

Length (time) of searches for
subject: 6 to 10+ minutes
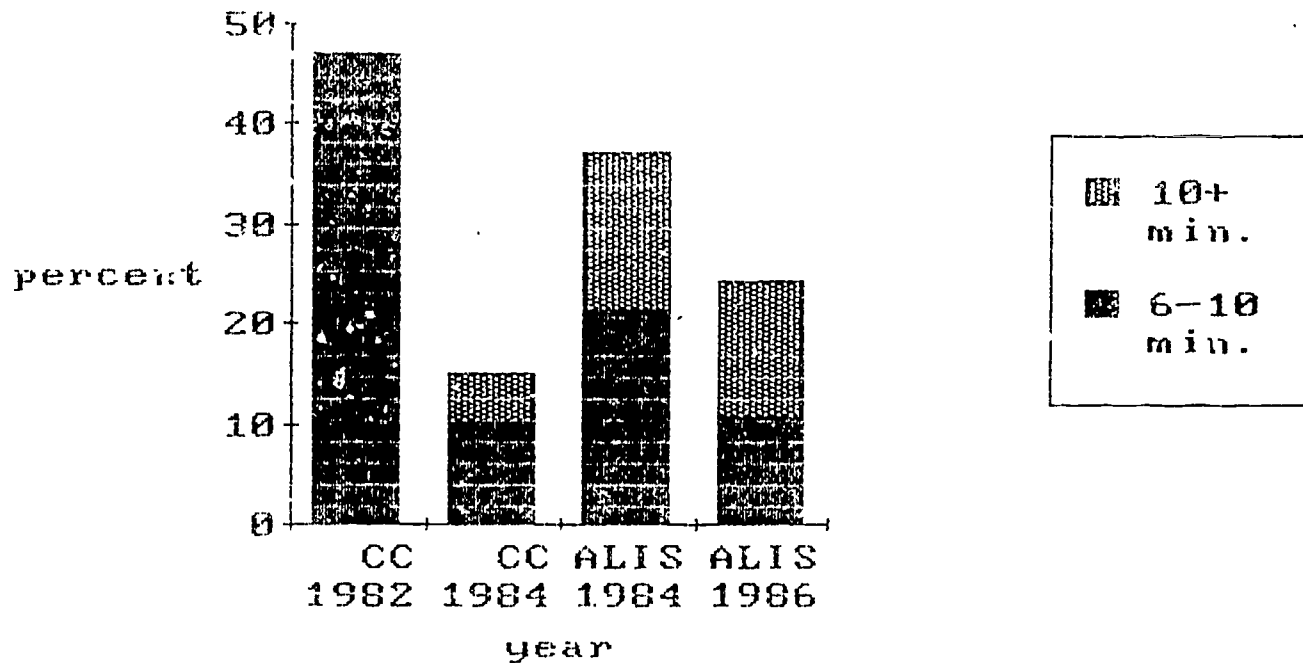
(Fig. 6)
This graph represents the percentages of subject searches
that took 6 minutes or longer to complete. See explanation for
Figure 5 for further comment.

Length (time) of known item searches
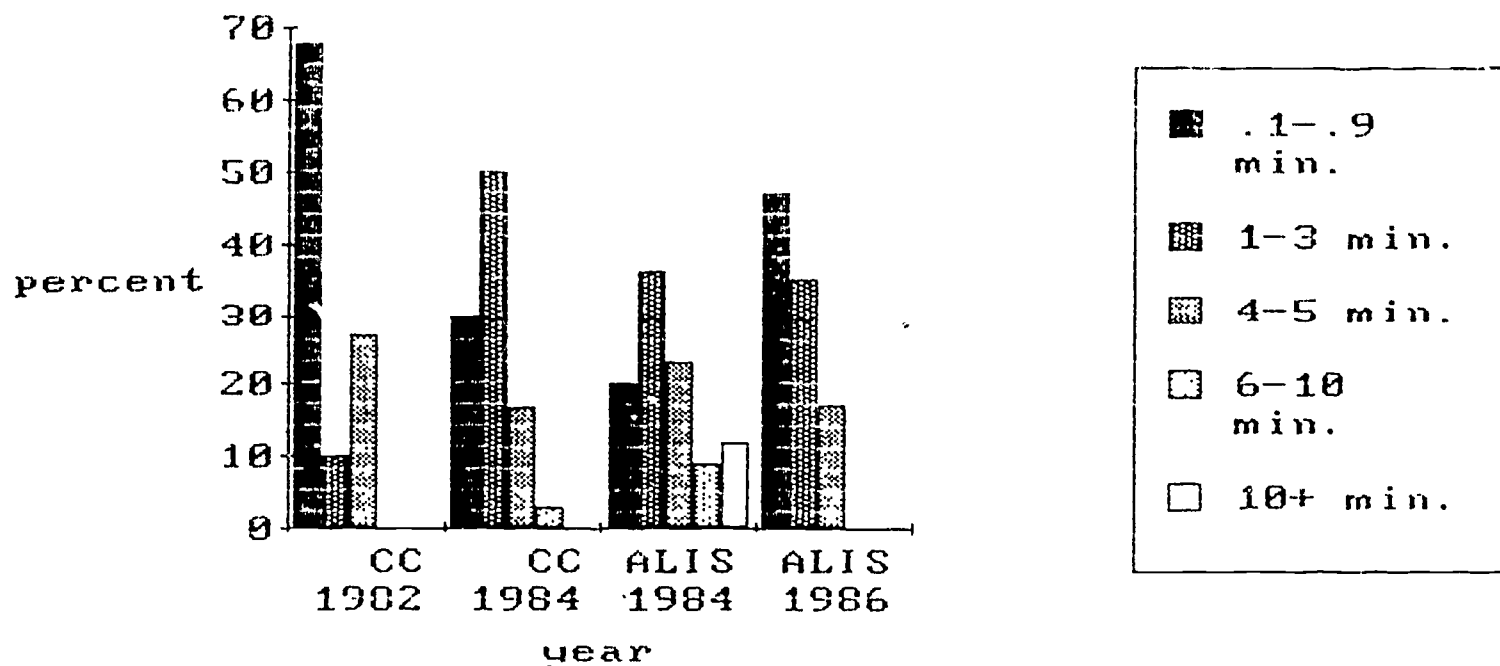
(Fig. 7)

Over 85% of known item searches in the online catalog were completed in 3 minutes or less. The longer search times reported in 1984 may be partly due to the fact that the survey did not explicitly distinguish between a single search and the total search session in that year.

Did you use LCSH for your subject
search? (Yes responses)
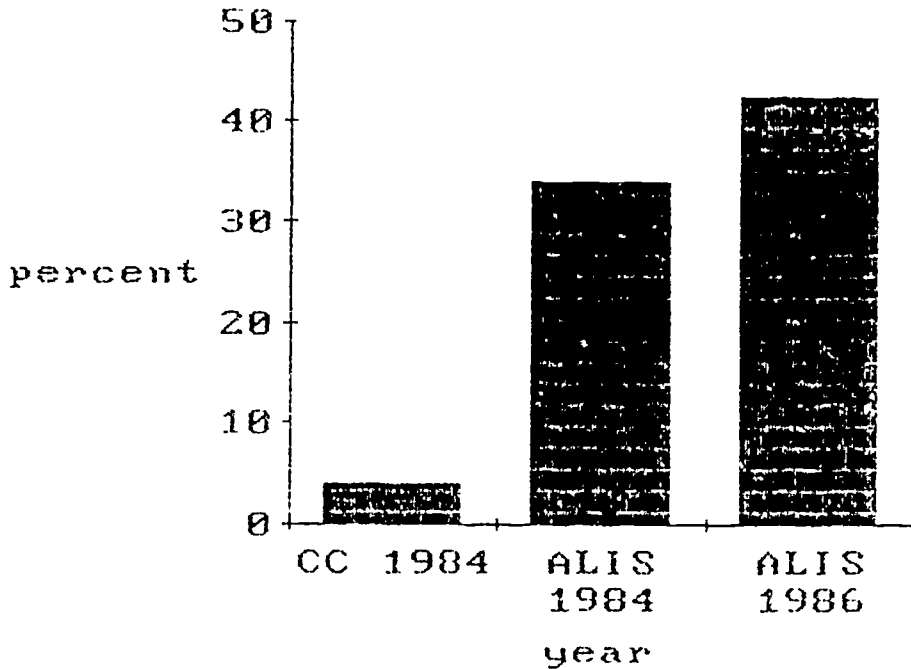
(Fig. 8)

The importance of using the proper vocabulary in online subject
searching was emphasized in the bibliographic instruction program.
The message had an impact on user's search behavior. Card catalog
users did not use the LCSH to a comparable extent.

Method of instruction in on-line catalog use
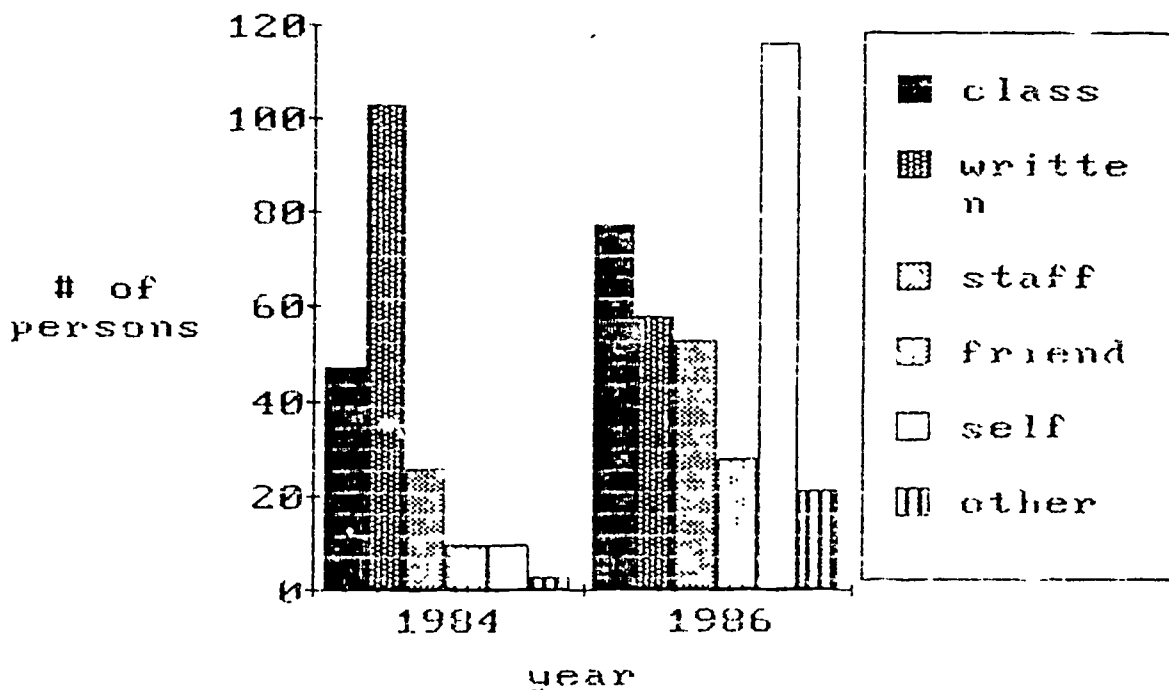
(Fig. 9)

This graph shows the ways patrons learned to use the on-line
catalog. They were allowed to check all answers that applied,
so the total number of responses is greater than the total
number of people surveyed. In 1984, a one page instruction
sheet as well as a detailed manual was available at each terminal.
These were the most heavily used form of instruction at that time.
By 1986 more people had been reached in classes presented by the
library instruction program. The highest number of responses was
in the category of experimentation on own. This reflects the
heavy use of on-line instructions included as part of the more
user friendly software version called PAC, (Public Access Catalog)
which was in operation in 1986.

Did you note whether the item
was checked out?
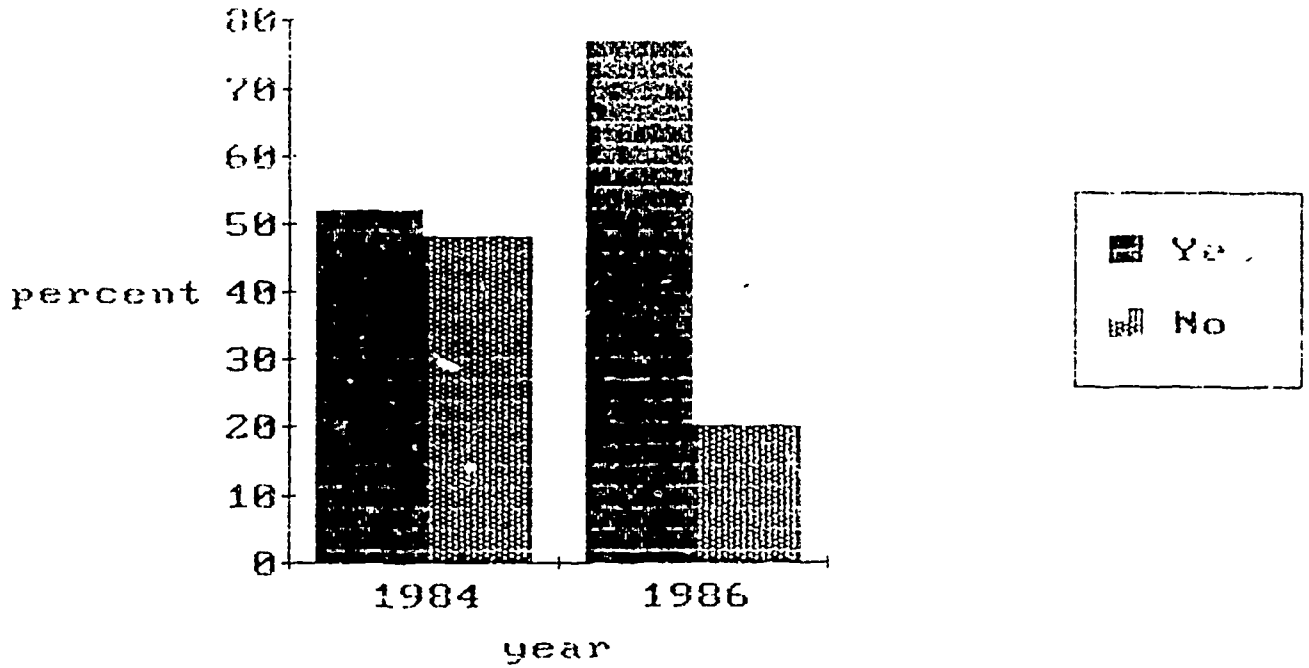
(Fig. 10)

An increase in use of the circulation information provided
by the online catalog was registered over time.

Which screen provided the information you needed?

(Fig. 11)

1986 respondents indicated that they used the circulation
information screen most heavily. This screen includes the call
number. The high use of the menu screen, which is a short
citation, may represent an error in question interpretation
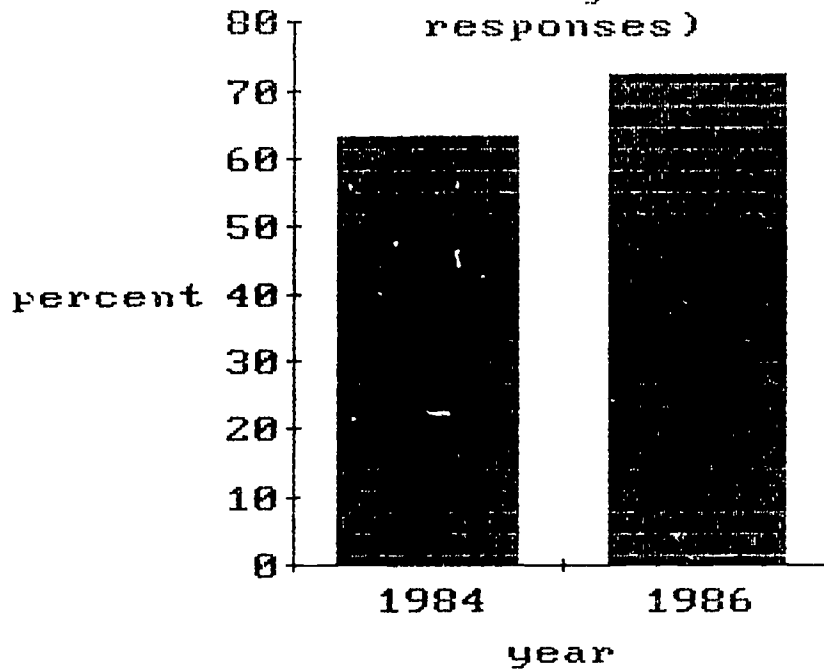on the part of the interviewers.

Use of HELP screens in 1986
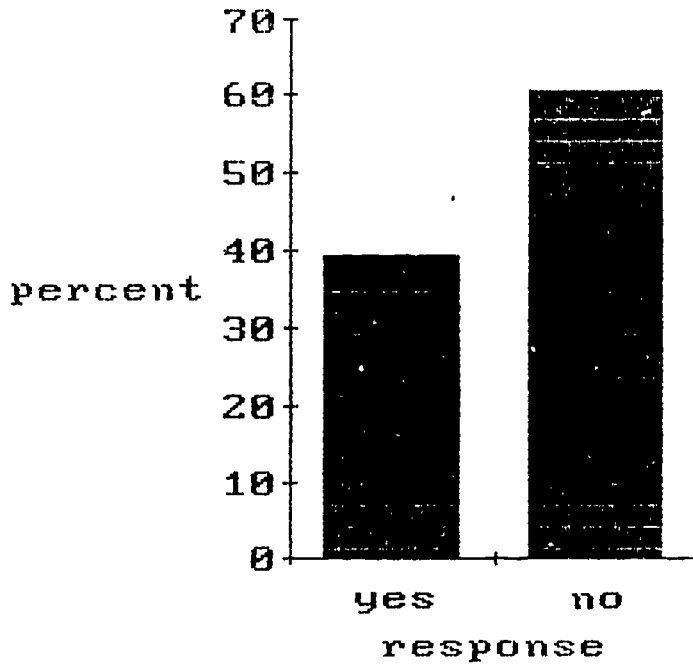
(Fig. 12)

About 40% of 1986 ALIS users indicated that they had used
online HELP instructions at some time in their use of ALIS
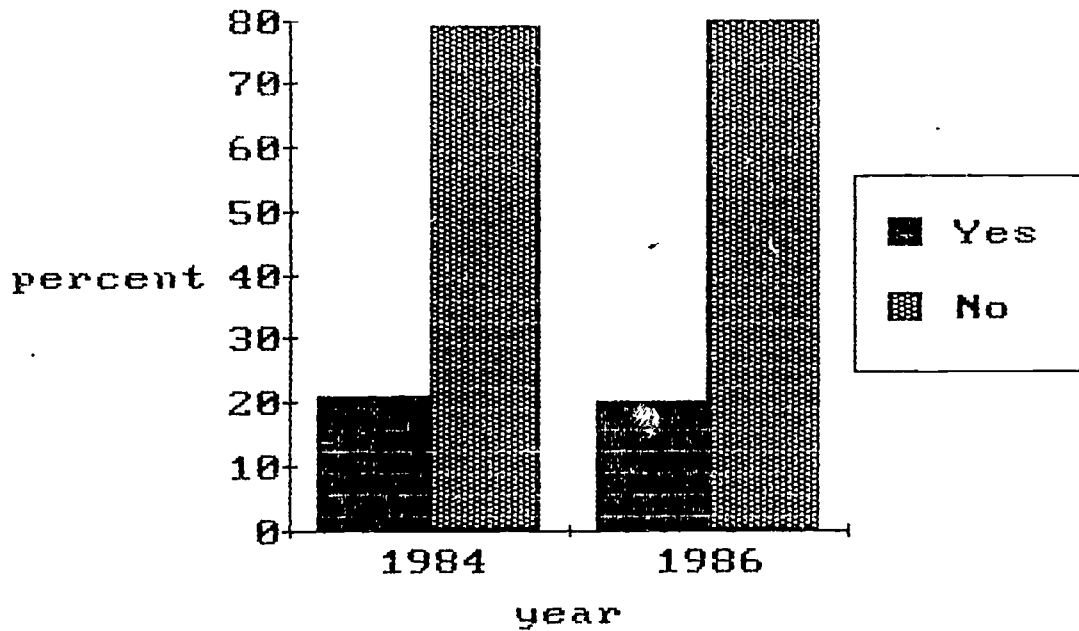(not necessarily for the current search).

Have you ever used the terminals on the other floors of the library? (# of yes responses)

(Fig. 13)

The surveys were conducted at terminals in the Reference area of the library. The majority of users had also used terminals in other locations of the library.
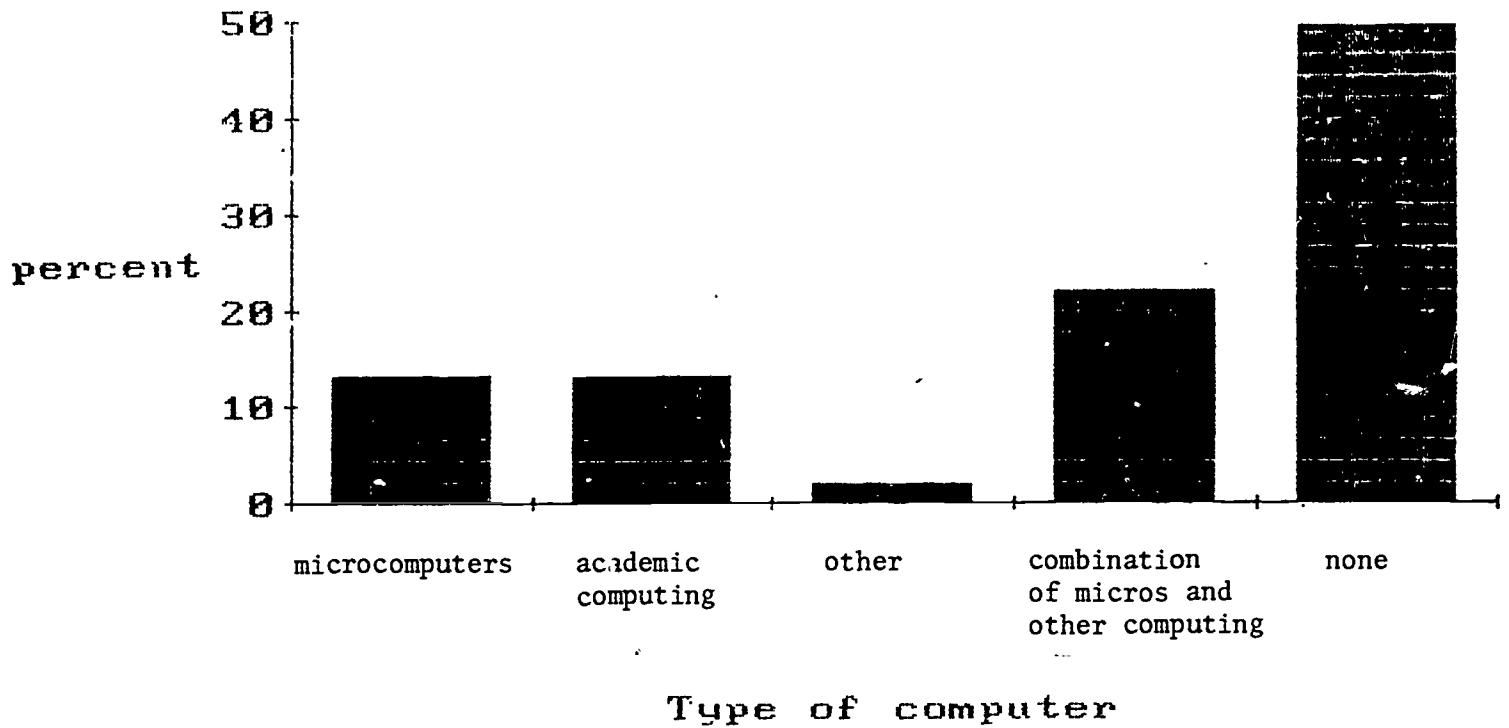
Have you ever used the printer with an ALIS terminal?

(Fig. 14)

The percentage of users who indicated that they had ever taken advantage of the availability of a printer with ALIS remained the same over time.

Previous computing experience

Type of computer

(Fig. 15)

    49% of 1986 ALIS users had no previous experience with other computers. This variable had no impact on their searching success.