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Class Number Searching in an Experimental Online Catalog

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In the Dewey Decimal Classification (DDC) Online Project, the texts of the DDC Schedules and Relative Index were incorporated into the searchable indexes and browsing capabilities of an experimental online catalog. The effectiveness of this online catalog enhanced with the DDC was tested in online retrieval experiments at four participating libraries. In this paper, subject searchers' use of the class number search capability is featured. Failure analyses of class number searches demonstrated the ability of this search to retrieve items relevant to searchers' topics of interest. Searchers' post-search interview comments highlight their experiences and their satisfaction with the results of this type of search. Based on the failure analyses and searchers' interview comments, recommendations are provided for the improvement of class number searching in online catalogs, particularly the incorporation of a library classification schedule into the online catalog.   (Author)

1. Introduction

Libraries' bibliographic records in online catalogs typically contain classification numbers like DDC (Dewey Decimal Classification) or UDC (Universal Decimal Classification). Most commercially available online catalogs have incorporated class number searching as a mode of subject searching. Although the actual search routines for class number searching differ from system to system, the entry of a class number by a patron searcher invokes the system to search an inverted file of class numbers extracted from bibliographic records and retrieve items with the particular class number. The major drawback of this approach is that patron searchers are required to know the *exact class number* that represents their search topic. What searchers view as a result of class number searches is a set of book titles, not a systematic outline of their subject (1, p. 95). If patrons could search the text of classification schedules and/or browse the text of the schedules during their online searches, they could match their topic with the terminology of the classification.

In the Dewey Decimal Classification (DDC) Online Project at OCLC, Dublin, OH, the texts of the DDC Schedules and Relative Index were incorporated into the searchable indexes and browsing capabilities of an experimental online catalog. The effectiveness of this online catalog enhanced with the DDC was tested in online retrieval experiments at four participating libraries: Library of Congress (LC), New York State Library (NYSL), Public Library of Columbus and Franklin County (PLCFC), and University of Illinois at Urbana-Champaign (UI). These experiments provided data for analyses of subject searchers' use of a library classification in an online catalog environment.

In this paper, subject searchers' use of the class number search capability is featured. Failure analyses of class number searches demonstrated the ability of this search to retrieve items relevant to searchers' topics of interest. Searchers' post-search interview comments highlight their experiences and their satisfaction with the results of this type of search. Based on the failure analyses and searchers' interview comments, recommendations are provided for the improvement of class number searching in online catalogs, particularly the incorporation of a library classification schedule into the online catalog.

2. Background and Project Objectives

Mechanization of classification schedules for information retrieval purposes was first carried out by Freeman and Atherton (2) in their study of the Universal Decimal Classification (UDC) as an entry vocabulary in an online bibliographic system. At the time of their study, there were few (if any) operational online retrieval systems available to library patrons. Interest in classification as a subject searcher's tool in online bibliographic systems was rekindled in late 1981 after a thirteen-year hiatus. At this time, the preliminary findings of the Council on Library Resources-sponsored Online Catalog Project demonstrated library patrons' 1) ability to use online catalogs to find library materials of interest, 2) their acceptance of this new form of the library catalog, and 3) their need for improved subject access in online catalogs (3).

The realization that the printed 19th edition of the *DDC* (4) was produced by computerized photocomposition prompted the OCLC Office of Research to ask Forest Press about the availability, for research purposes, of the print tapes used to produce this 19th edition. With the eventual support of Forest Press, the Council on Library Resources, and OCLC, the DDC Online Project team in the OCLC Office of Research obtained selected portions of a machine-readable DDC from Inforonics, Inc., which was converted from the print tapes that originally served to produce the 19th edition of the printed DDC using computerized photocomposition.

The objectives of this project were to
1. Use the consensus of DDC experts to determine strategies for searching and displaying the DDC in an experimental online catalog
2. Demonstrate the DDC as a searcher's tool for subject access, browsing, and display in the experimental online catalog
3. Test the effectiveness of the DDC as a searcher's tool in this catalog
4. Evaluate the demonstration and test results of the DDC as a searcher's tool and disseminate the results of the research project

The experimental online catalog was actually composed of two online catalogs: (1) the Dewey Online

Catalog (DOC), in which the Dewey Decimal Classification had been incorporated as a searcher's tool for subject access, browsing, and display, and (2) the Subject Online Catalog (SOC), in which the DDC had not been incorporated. Class number searching was available in both SOC and DOC, but the class number search of DOC directed searchers to browsing displays of the DDC Schedules. SOC and DOC had subject searching capabilities in addition to class number searching (5, p. 54–77).

3. Developing the Experimental Online Catalog

The databases of the experimental online catalog were created from three data sources: 1) machine-readable cataloging (MARC) records from the four participating libraries in selected subject areas of the DDC, 2) the 19th edition of the DDC Schedules, and 3) the Relative Index. Each participating library contributed between 8,000 and 15,000 MARC records in subject area selected by the library. Between 8,000 and 12,000 records per library were processed into the experimental online catalog:

1. *Library of Congress (LC):* Economics (330–339), commerce (380–382), and management (658); database size = 11,865 records.
2. *New York State Library (NYSL):* New York State geography (917.47–917.4799), United States colonial history (973.1–973.2), and New York State history (974.7–974.799); database size = 8,144 records.
3. *Public Library of Columbus and Franklin County (PLCFC):* Sports, recreation, and performing arts (790–799); database size = 9,719 records.
4. *University of Illinois at Urbana-Champaign (UI):* Mathematics (510–519); database size = 7,613 records.

The DDC Online Project team selected fields from libraries' MARC records and the machine-readable DDC Schedules and Relative Index for indexing and display in SOC and DOC. Class number captions and including, general, class here, and example notes from the Schedules and Relative Index entries were selected for indexing and display in DOC only. Classifier's notes and footnotes were not processed into DOC because these notes would not have been helpful to library patrons and staff performing subject searches. Special handling had to be given to DDC Schedules and Relative Index data to make this information more presentable, accessible, and understandable to DOC searchers. For example, a range of DDC class numbers was expanded to individual Schedule records, each bearing a unique class number in a range and the same DDC caption and notes. Dummy DDC class numbers with trailing zeros and captions had to be created in DOC to enable subject searchers to browse Schedule numbers with embedded zeros and their associated captions and notes.

A Schedules DDC class number field was specially created and added to bibliographic records in DOC. The Schedules DDC class number of a bibliographic record was defined as a DDC class number that exists in the Schedules and is the best match of the record's DDC class number. The Schedules DDC class number en-

abled DOC to automatically match class numbers in libraries' bibliographic records with class numbers in the DDC Schedules and Relative Index and, subsequently, to add class number captions and including, general, class here, and example notes from the Schedules and Relative Index entries to DOC bibliographic records. SOC and DOC bibliographic records contained the same information, but the *DOC records were enhanced with subject-rich captions and notes from the DDC Schedules and Relative Index entries.* Although DOC records were enhanced with the DDC, only Schedule captions (of the DDC information added to records) were displayed in bibliographic records.

There were four Subject Online Catalogs and four Dewey Online Catalogs, i.e., one for each of the four participating libraries. We wanted first-time users of SOC and DOC to be able to search these catalogs with ease and find items relevant to their topics of interest, since most searchers in the library patron and staff retrieval tests would be using the experimental online catalogs for the first time. Therefore, the experimental online catalog was a menu-based system, which we felt was an appropriate interface for first-time users.

4. Class Number Searching in SOC

SOC had the traditional subject searching capabilities of online catalogs, namely subject heading, subject heading and title keyword, and class number searching. The class number search in SOC was named a "call number search" in the online catalog menus and displays, because we felt that most patron searchers of online catalogs would not know what "class number search" meant.

In class number searches, the SOC searcher entered a DDC class number of three or more digits, which SOC compared with the DDC class number of bibliographic records. SOC treated the class number as if it had been truncated and thus retrieved records with the exact class number entered and class numbers beginning with the entered number. For example, the searcher inputting the class number 332.743 retrieved records assigned class numbers 332.743 and 332.7430202.

```
What would you like to do? > sc
Enter call number > 332.743

>>>>> YOUR REQUEST...sc:332.743
     10 ITEMS IN SET 1  (332.743)

   THE FOLLOWING IS A SUMMARY OF YOUR SEARCHES:
   SET  ITEMS    REQUEST
    1    10      sc:332.743

OPTION   DESCRIPTION
   DI    Display items
   SO    Start over
```

Fig. 1: Number of retrieved items in a SOC class number search for "332.743"

In Fig. 1, the interaction between SOC and a user entering a class number is shown. In this example, SOC responds with number of items retrieved bearing the searcher-entered class number or beginning with this class number, saves the results in set 1, and gives the user the option to display items (DI) or start over (SO).

5. Class Number Searching in DOC

DOC had both the traditional subject searching capabilities of SOC and enhanced subject searching capabilities because the DDC Schedules and Relative Index had been incorporated in DOC. The class number search in DOC was called a "call number search" in online catalog menus and displays because we felt that most patron searchers of online catalogs would not know what a "class number search" meant. DOC's class number search directed searchers to a systematic outline of their subject based on their entry of class numbers from the DDC Schedules. DOC's class number search is analogous to consulting a class number in the printed DDC Schedules. DOC responded to the user-entered class number with 1) a List of Topics (or captions) from the DDC Schedules at the same level in the hierarchy as the entered class number; 2) a list of options that allowed the user to browse more general or specific captions, to get more information about a listed caption, or to display bibliographic records assigned the caption; and 3) the user-entered class number marked with an asterisk (*) in the left margin. For example, a user entering class number 332.743 would obtain a List of Topics composed of captions from the DDC Schedules from 332.740 to 332.749 (Fig. 2).

To fit one entire level on the screen, each DDC caption was truncated so that it did not occupy more than one line, and the notes from the DDC Schedules were excluded from the display. However, the complete DDC caption, Schedule notes, and DDC Relative Index entries referring searchers to the listed class number could be viewed by selecting the GN (get detailed notes for a topic) option listed in the options menu following the List of Topics. DOC's display of the class number, caption, and notes from the Schedules and Relative Index entries in shown in Fig. 3.

DOC's subject outline search also directed subject searchers to displays of the DDC Schedules. DOC's subject outline search was unique to this system and directed searchers to a systematic outline of their subject based on their entry of *subject terms*. (A complete description and analysis of subject outline searches is provided by Markey and Demeyer (5, p. 74–77).) The entry of subject terms by a searcher through the subject outline search invoked the system to search an inverted file of words from the first-listed subject heading in bibliographic records and from the text of the DDC. This search then resulted in a browsing display of the text of the DDC Schedules where items on the searcher's topic of interest could be found.

6. Methods Used to Conduct the Online Retrieval Tests

Two online retrieval tests were conducted with the four participating libraries' patron and staff: 1) the partially

```
What would you like to do? > sc
Enter call number > 332.743

>>>>> YOUR REQUEST...sc:332.743

ITEMS ON YOUR SUBJECT ARE FOUND UNDER 332.743 IN THIS OUTLINE OF RELATED
SUBJECTS.

GENERAL TOPIC : 332.74 Other forms of credit
      LINE  ITEMS  AREA        TOPIC
        A      3   332.742     Commercial, mercantile, industrial
  *     B     10   332.743     Personal loans

OPTION   DESCRIPTION
    BG   Browse more general topics
    BS   Browse more specific topics
    GN   Get detailed notes for a topic
    SL   Select line(s) to display items
    SO   Start over
```

Fig. 2: List of Topics from the DDC Schedules

```
What would you like to do? > gn b

>>>>> YOUR REQUEST...gn b

*Notes for items on this TOPIC are found at the designated shelf LOCATION.
 DEWEY INDEX describes the contents of most items found at this shelf AREA.

DETAILED NOTES FOR TOPIC : Personal loans

AREA          332.743
TOPIC         Personal loans
INCLUDING     Including chattel mortgages, consumer credit
DEWEY INDEX   Consumer--credit--economics
              Pawnbroking--economics
              Personal--loans--economics
              Secured transactions--credit economics
```

Fig. 3: DOC display of Schedule information and Relative Index entries for "332.743"

controlled, but authentic, Comparison Search Experiment, in which library patrons conducted online searches on a topic of their own choosing – sequentially – on SOC and DOC, and 2) a controlled field experiment, the Sample Search Experiment, in which library staff performed equivalent but different subject searches in SOC and DOC for topics assigned to them by the DDC Online Project team. The design of the retrieval experiments was based on the design of comparable experiments by Siegel, et al. (6), in their evaluation of two prototype online catalogs. Two retrieval experiments were employed to test the experimental online catalog to ensure a high degree of confidence and strength in the results of the experiments that were obtained under different experimental conditions with different user populations.

In both retrieval experiments, the time spent searching, estimated recall, and precision were dependent, quantitative measures collected in each SOC and DOC search. Patrons and staff in the online retrieval tests were asked which system was satisfactory for the search and their system preference. They also responded to open-ended questions about ease of system use, system differences, and the reasons for their system preference and search satisfaction. Qualitative data analyses were performed on patron and staff responses to such open-ended questions.

A total of 160 different library patrons searched the experimental online catalog at the four participating libraries and performed a total of 160 searches in SOC and 160 searches in DOC for a topic of their own choosing. A total of 60 different library staff searched the experimental online catalog at the four participating libraries and performed a total of 180 searches in SOC and 180 searches in DOC for different topics assigned by the DDC Online Project team. The online retrieval tests provided much data for a variety of quantitative and qualitative analyses.

7. Overall Results of Class Number Searches in SOC and DOC

Table 1 lists the numbers and percentages of times patrons and staff entered class numbers in searches and were directed to relevant items. Generally, class number searches were more frequent in SOC than in DOC, but this frequency was attributed to the availability of only three subject searching options in SOC and four subject searching options in DOC. That is, SOC searchers only had three subject searching options from which to choose, so they selected the class number more frequently in SOC to complete the online search.

Generally, a greater percentage of searches in DOC than in SOC resulted in relevant items. Eighteen percent of patrons' class number searches in SOC led to relevant items; 25 percent of patrons' class number searches in DOC led to relevant items. Twenty-six percent of staff class number searches in SOC led to relevant items; 35 percent of staff class number searches in DOC led to relevant items. Class number searches in DOC did not always lead directly to the retrieval of relevant items. DOC searchers relied on supporting options for

| Patrons | Library Staff | | | |
	SOC	Total (Four Libraries) DOC	SOC	Total (Four Libraries) DOC
1. Searchers' selection of the class number (SC) search option	56	28	90	51
a. Relevant items	10	2	23	8
b. Percentage of items SC option directly to relevant items	18%	7%	26%	16%
c. Percentage of times zero items retrieved	14%	18%	18%	10%
2. Searchers' selection of of the select lines to display items (SL) option	NA	5	NA	7
a. Relevant items	NA	3	NA	4
b. Percentage of times SL option led directly to relevant items	NA	60%	NA	57%
3. Searchers' selection of the browse specific topics (BS) option	NA	7	NA	10
a. Relevant items	NA	2	NA	6
b. Percentage of times BS option led directly to relevant items	NA	29%	NA	60%
4. Searchers' selection of the browse more general topics (BG) option	NA	3	NA	1
a. Relevant items	NA	0	NA	0
b. Percentage of times BS option led directly to relevant items	NA	0%	NA	0%
Percentage of times SC option led to relevant items (directly or through supporting options SL, BS, or BG)	18%	25%	26%	35%

Table 1. Class Number Searches Directing Searchers to Relevant Items

displaying items (SL option) and browsing specific Schedule captions (BS option). The few times (four times) that searchers used the option to browse general Schedule captions (BG option) did not result in the retrieval of relevant items.

8. Failure Analyses of Class Number Searches

Class numbers entered in both SOC and DOC searches by library patrons and staff had usually been obtained by searchers in retrieved records that they had displayed in alphabetical, direct, or subject outline searches prior to the class number search. Fig. 4 shows the highlights of a class number search in SOC in which the user first performed a direct (i.e., keyword) search for "New Lebanon," retrieved six items, and displayed five of the six items. Three of these five displayed items were assigned

Enter an option > sd
Enter subject to search > new lebanon

>>>>> YOUR REQUEST...sd:new lebanon
    3465 ITEMS FOR "new"
      8 ITEMS FOR "lebanon"
      6 ITEMS IN SET 1 (new lebanon)

THE FOLLOWING IS A SUMMARY OF YOUR SEARCHES:
SET   ITEMS   REQUEST
 1   6   sd:new lebanon

OPTION DESCRIPTION
   SA Search alphabetically for "new lebanon"
   DI Display items
   SO Start over

Enter an option > di

>>>>> YOUR REQUEST...di 1

   ●
   ●
   ●

ITEM 3 OF 6
DEWEY NUMBER   974.739qN53s
COLLECTION   H
TITLE   Marriages in New Lebanon, New York [performed by] Rev. Silas
              Churchill, 1795-1851 [and Ira Hand, esq., justice of the
              peace, 1832-1852].
AUTHOR   Shepard, Elmer Irwin 1878-
PUBLISHER   1943

   ●
   ●
   ●

Enter an option > sc
Enter call number > 974.739

>>>>> YOUR REQUEST...sc:974.739
    102 ITEMS IN SET 2 (974.739)

  THE FOLLOWING IS A SUMMARY OF YOUR SEARCHES:
  SET ITEMS   REQUEST
   1   6   sd:new lebanon
   2   102   sc:974.739

OPTION DESCRIPTION
   DI Display items
   SO Start over

Enter an option > di
Enter a set number to display > 2
   ●
   ●
   ●
ITEM 9 of 102
DEWEY NUMBER   974.739qAv21
COLLECTION   H
TITLE   Columbia County, New York, cemeteries: private and scattered.
AUTHOR   Van Alstyne, Harriet Huyck Kellogg 1875-
PUBLISHER   1938

Would you like to see the next item? ("RETURN"=yes, N=no) >

   ●
   ●
   ●

Explanation

The user performs a direct (or keyword) search for "new lebanon" and retrieves 6 items.

Three of the five items displayed and judged relevant contain the class number 974.739. One relevant item is shown here.

The user enters 974.739 in SOC through the call number (SC) search and retrieves 102 items.

The user displays 12 of the 102 items and judges most of the 12 items relevant for her genealogical research on "New Lebanon" although these items cover the entire county in which New Lebanon is located.

Fig. 4: Class number search in SOC for "New Lebanon, N.Y."

Table 2. Class number searches in which the user identified a relevant class number

Expressed Topic	Subject Search in which Number Identified/System/User	User-entered Class Number (Caption in DOC)
King Philip's War	Alphabetical/SOC/Staff	973.24 (Later 17th century, 1664–1689)
19th century families living in Niagara County or Niagara Falls (city)	Direct/SOC/Staff	974.798 (Niagara County)
Pequot War	Subject outline/DOC/Staff	973.22 (Other early settlements, 1620–1643)
Business etiquette	Direct/SOC/Patron	658.452 (Oral)
Combinatorial analysis	Alphabetical/SOC/Patron	511.6 (Combinatorial analysis)
Incompleteness theorem	Subject outline/DOC/Patron	511.3 (Symbolic mathematical logic)
Rings	Direct and alphabetical/SOC/Staff	512.4 (Rings integral domains, ideals)
Bowling	Subject outline/DOC/Patron	794 (Indoor games of skill)
Affine geometry	Alphabetical/DOC/Staff	516.4 (Affine geometry)

the class number 974.739, which the user then entered in a class number search and retrieved and displayed additional items which she judged relevant to her genealogical research. Successful class number searches in the experimental online catalog, in which this strategy of identifying a DDC class number of interest from items displayed in a previous search was used, are enumerated in table 2.

In class number searches in both SOC and DOC, patrons and staff were well aware that they had to know the right class number to enter before proceeding with a class number search. Some even questioned the value of this search in their post-search interview remarks about class (or call) number searches:

- The call number search in SOC is useless unless you know the right call number to enter into the catalog. (One patron, PLCFC)
- Why would anyone want to search for call number? (One patron, PLCFC)
- The call number search in SOC is difficult because you have to look at an item to find a candidate call number to enter. DOC leads you to call numbers through the SS (subject outline) search. (One staff, NYSL)
- When I entered a class number (650) into SOC, I didn't know what subject was covered by this number until I displayed items. (One patron, LC)
- To use DOC's call number (SC) search, you still need to know the meaning of the call number you want to enter into the catalog. (One patron, PLCFC; one staff, NYSL)

Patrons and staff recognized the difference between the class (or call) number searches in SOC and DOC and preferred DOC's class number search:

- SOC just provides you with the number of items on the call number. DOC provides you with a phrase for the call number and you can choose the phrase you like. (One staff, UI)
- DOC leads you to an outline of topics. I'd like this capability in SOC to help you know what a call number means. (Two staff, PLCFC)
- I found a call number area right on my topic, and I didn't display items because I'd browse the shelf at that number. (One patron, LC)
- It is helpful to search for call numbers in DOC because DOC explains what your call number is about and you can use the BS (browse more specific topics) option to find more specific topics. (Two staff, UI; three patrons, LC; one patron, UI)
- If you know the subject of your call number, SOC's call number search is sufficient. If you don't know the subject of your call number, the call number search in DOC is better. (One staff, UI)
- You have to "go fishing" in SOC to find the right call number. (One patron, LC)

There were times when searchers entered a general (i.e., three-digit) class number that they had not re-

trieved in other subject searches. Searchers then seemed to wander aimlessly through the catalog and seldom, if ever, retrieved and displayed relevant items. In a DOC search for "Basketball," the user-entered class number 791 generated a List of Topics in which the user-entered class number was listed along with its caption, "Public performances," where library material on topics such as motion pictures, radio, televison, and circuses was found. After browsing for a while, the user started the search over again and chose subject search options other than the class number search.

Patrons and staff whose class number searches wound up as aimless wandering through the catalog usually entered short, three-digit class numbers, or class numbers where items on a variety of topics were classed. In a DOC search for "19th century railroad tours of New York State," the class number 917.47 was common to all four items retrieved and displayed in a direct search for this topic. The user entered 917.47 in a class number search, retrieved 1,815 items, and did not display any of these items. The searcher's action of entering this class number was a logical one given the class numbers of the relevant items retrieved in the direct search. Staff and patrons noted that class (or call) number searches retrieved many items:

- When you enter a call number, you get too many items. (One staff, UI; three staff, NYSL)
- I got call numbers from items I'd displayed, but I entered the numbers and obtained too many items. This isn't always a sound searching strategy. (One staff, NYSL)
- I would like to browse more specific topics in SOC's call number search because it retrieves too many items. (Three staff, LC)
- How can a call number search help you? It retrieves too many items. (One staff, LC)
- I'd like to limit the results of call number searches by combining results with Boolean operators. (One staff, LC)

9. Recommendations for Improving Class Number Searching in Online Catalogs

Class number searches in DOC generated a List of Topics around the user-entered class number; however, a List of Topics could only be constructed when users entered valid class numbers enumerated in the 19th edition of the DDC Schedules. When users entered class numbers found on retrieved relevant records but not in the 19th edition of DDC, the system responded with an explanatory message telling them how to successfully enter a class number into DOC:

>>>>> YOUR REQUEST. . .sc:658.054

THE SEARCH WAS NOT SUCCESSFUL BECAUSE OF
ONE OF THESE REASONS:
1. IF YOUR CALL NUMBER IS OUTSIDE THE RANGE
   330–333, 336–339, 380–382, 650 OR 658–659, PLEASE
   CHOOSE A NUMBER WITHIN THE RANGE.
2. IF YOUR CALL NUMBER IS WITHIN THE RANGE,
   THEN IT MUST BE TOO LONG, PLEASE SHORTEN
   IT.

Searchers' discouragement with this message led us to
conclude that in this instance we should have imple-
mented a shelflist-browsing-by-title capability in DOC.
This would have allowed searchers whose entered class
numbers matched one contained on an item and did not
match a class number in the 19th edition of the DDC
Schedules to display items in shelflist (i.e., class
number) order. In a direct search in DOC for "Uses of
Microcomputers in Business," a staff member identified
658.054 as a class number that he'd enter using the class
number search; however, DOC displayed the discourag-
ing message and the searcher would have had to enter
the class number 658.05 to retrieve and display items
with the desired number. Had DOC instead responded
with a list of titles in shelflist order, the user would have
retrieved items entitled *Catching up with the computer*

*revolution, Choosing and using a business microcom-
puter, Computers in business: how managers are using
computers to support their decision-making,* and *Hand-
book of computer applications for the small or medium-
size business.*

Patron and staff experiences with class number
searching in SOC and DOC led us to recommend im-
provements to this type of search. Figure 5 summarizes
these recommendations in flowchart format. A user-
entered class number that matched a class number in the
DDC Schedules results in a List of Topics composed of
captions from the DDC Schedules. This is the way in
which DOC responded to all class number searches.
There are more appropriate ways for online catalogs to
respond.

When the user-entered class number matched a
number from the Schedules, the system responded with
a List of Topics such as the one shown in figs. 2 and 4.
Sometimes the number of retrievals per class number
and caption was unusually large; for example, the se-
cond-listed caption in the List of Topics in fig. 4 resulted
in a set of 102 items. Often, searchers wanted to reduce
the number of items by limiting these results by certain
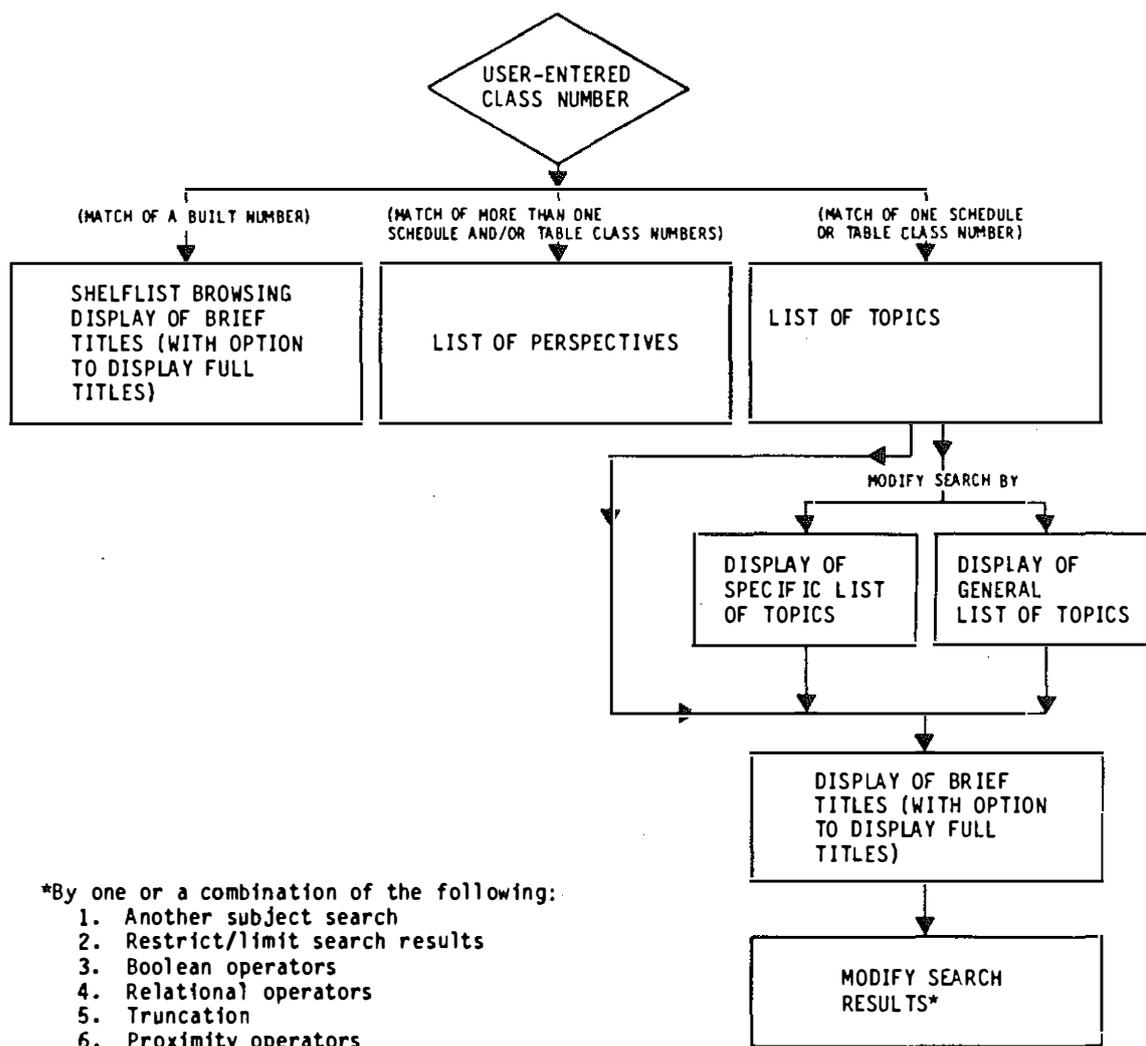criteria, e.g., a subject term or phrase, publication date,

*By one or a combination of the following:
   1. Another subject search
   2. Restrict/limit search results
   3. Boolean operators
   4. Relational operators
   5. Truncation
   6. Proximity operators

Fig. 5: Flowchart of class number searching in online catalogs

language of items. The online catalog should permit searchers to limit the results of highly posted subject searches by these and other criteria.

When a user-entered class number matches a number from both Schedules and Tables, the system should respond with an intermediary List of Perspectives that displays retrieved Schedule and Table captions and asks the searcher to choose between captions. An example of such a user-entered class number is shown in Fig. 6.

```
Enter an option > sc
Enter call number > 747

>>>>> YOUR REQUEST...sc: 747

  Please wait ....
YOUR SUBJECT IS TREATED FROM 2 PERSPECTIVES:

LINE PERSPECTIVES
  A  New York
  B  Interior decoration

OPTION   DESCRIPTION
  BP     Browse a perspective
  SO     Start over
```

Fig. 6: User-entered class number matching class numbers in Schedules and Tables

A user-entered class number that matches a synthesized class number should result in a shelflist browsing display composed of brief titles. A searcher researching the topic "Foreign investments in the United States" might identify the synthesized class number 332.6730973 relevant to his topic from the class numbers in items displayed in previous searches. If this searcher were to enter this synthesized class number into the online catalog, the system should respond with the shelflist browsing display shown in Fig. 7.

The options following the shelflist browsing display allow the searcher to browse forward and backward (BF or BB) in the display to scan titles shelved after the last

title or before the first title in the list and to display full bibliographic information (ST). Repeatedly entering the BB or BF options, the searcher can browse the entire shelflist of the library from 001 to 999. Since the result of the selection of titles from the shelflist browsing display is individual titles, no modification of the result is necessary. However, limiting the shelflist by year of publication, language, or branch library may be a desired capability in certain online catalogs.

10. Summary

In class number searching in both SOC and DOC, users had to first identify a class number of interest using a subject searching option other than the class number search option. Both patrons and staff culled the class numbers in retrieved, relevant items displayed in alphabetical, direct, or subject outline searches; entered these numbers into the system; and, in many instances, retrieved additional relevant items. Sometimes they culled a class number from the results of an alphabetical or direct search that was highly posted in a class number search and, thus, did not retrieve additional relevant items, because there were items on many different and general topics assigned the same class number as the one culled by the searcher. Searchers preferred DOC's class number search to SOC's class number search, because the former provided them with a List of Topics from which they could choose a listed topic or manipulate the list by browsing more specific topics.

The searcher usually needed some guidance entering class numbers – from the results of searches other than class number searches. Otherwise, entering a class number was like a shot in the dark because the searcher did not know the "meaning" of a class number in SOC or DOC until retrieved items or the List of Topics was displayed, respectively. In shot-in-the-dark searches in SOC, searchers repeatedly entered different class numbers and displayed a few items until they obtained satis-

```
What would you like to do? > sc
Enter call number > 332.6730973

>>>>> YOUR REQUEST...sc:332.6730973

FULL CALL NUMBER, BRIEF TITLE, AND YEARS OF ITEMS ON THE BOOKSHELF NEARBY "332.6730973" ARE:

LINE  CALL NUMBER/TITLE/DATE
  A  332.6730968 B55/ Financial aspects of economic sanctions on South Africa/1981
  B  332.673096891 C557/ Foreign companies and international investment in Z1/1980
  C  332.6730973 B25/ Foreign manufacturing investment in the U.S./ 1983
  D  332.6730973 D57/ Direct investment in the United States by foreign gover/1983
  E  332.6730973 F6/ Foreign investment in the United States/ 1983
  F  332.6730994 I58/ Investments in Argentina/ 1981
  G  332.67309969 S24/ A listing of foreign investments in Hawaii/ 1981
  H  332.678 C34/ Strategic investing/ 1982
  I  332.678 C66/ Make money on the interest rate roller coaster/ 1982
  J  332.678 D82/ The duck book/ 1982

OPTION   DESCRIPTION
  BF     Browse forward in title list
  BB     Browse backward in title list
  ST     Select title for full information
  RS     Review searches
  SO     Start over
```

Fig. 7: Shelflist browsing display for the user-entered built class number "332.6730973"

factory results or gave up. In shot-in-the-dark searches in DOC, searchers employed the browsing and selecting options until they obtained satisfactory results or gave up.

Class number searches were best when the system response was a List of Topics with system options to browse and select listed topics. When searchers selected a highly posted class number and caption and created a set of items, they often wanted to reduce the number of items in the retrieved set by another word or phrase or by other limiting criteria; future implementations of class numbers searches should allow searchers to limit the results of previous searches. When searchers entered a class number from which a List of Topics could not be constructed, i.e., a class number that was not listed in the 19th edition of the DDC Schedules, DOC should have responded with a shelflist browsing display of titles so that the user could at least browse the titles (and other bibliographic information, as needed) of the items shelved in the neighborhood of the user-entered class number. A shelflist-browsing-by-title capability is recommended for online catalogs enhanced with the DDC to support class number searches that fail because the user-entered class number is not enumerated in the Schedules but is assigned to the library's bibliographic records.

When the user-entered class number matched a number from the Schedules and Tables, the system should respond with an intermediary List of Perspectives that allows the searcher to choose between captions. In the DDC Online Project, only the DDC Schedules and Relative Index were incorporated into the experimental online catalog. Thus, subject retrieval of items through the DDC was limited to the best match of the class number in the classification field of bibliographic records (which corresponds to class numbers enumerated in the DDC Schedules). If the coding scheme proposed by Wajenberg (7) were applied to the individual components of synthesized DDC numbers, we could have identified and indexed these components and enhanced bibliographic records with additional subject information from the DDC Schedules and Tables. For example, users could find all library materials on New York State through an enhancement of records with the Table class number 747. Users could browse the DDC Tables under 747 to find a specific county or city of interest; users could also limit the results by another topic such as "Professional football" (Schedule class number 796.33264) or "Noise Pollution" (Schedule class number 363.74).

Class number searching was a successful subject searching strategy for patron and staff searchers of the experimental online catalog. Their class number searching experiences revealed how class number searches can be redesigned to improve the performance of this subject search and how a library classification can be incorporated into class number searches to enable online catalog users to browse a systematic outline of their subject.

Acknowledgments

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