
Online tables of contents for books: effect on usage*

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Objectives: To explore whether the presence of online tables of contents (TOC) in an online catalog affects circulation (checkouts and inhouse usage). Two major questions were posed: (1) did the presence of online tables of contents for books increase use, and, (2) if it did, what factors might cause the increase?

Method: A randomized and stratified design was used in tracking usage of 3,957 book titles that were previously divided into two groups: one with TOC and one without TOC. Stratification was done for year of imprint, location, subject, previous use, circulating or non-circulating status, and presence of TOC. The use was tracked by the online catalog statistics in the InnoPac online catalog for fourteen months.

Results: The study found that tables of contents do increase usage. It also showed a correlation in the size of the effect based on the currency of the titles. In general, even after adjusting for all of the variables (publication date, location, circulation status, subject, and previous use), the odds of a title being used increased by 45% if the titles had online tables of contents, a statistically significant impact at the 0.05 level.

Conclusions: This case-control study presents new information about the impact on circulation and inhouse use when tables of contents for books are added to the online catalog record. The study helps to establish the positive role of tables of contents in online catalogs. The research establishes TOC as a major parameter that can be successfully studied using quantitative methods. The study also provides information professionals with some guidance on when enhancement of TOC is likely to be most effective in increasing the use of existing collections.

Interest in enhancing the online catalog has been growing steadily since the late 1980s. Information professionals in libraries have experimented with different ways to offer additional access to materials. Such experiments include increasing the number of subject headings, providing various enhancement projects, applying index information or abstracts, and suggesting classification changes. This study focuses on the im-

part of adding online tables of contents (TOC) for books in the online catalog.

With rising costs for library resources and with dwindling funds for collections, the development of innovative means to increase the use of existing resources helps to squeeze more out of less. The implementation of online tables of contents for books is an appealing way to increase the use of existing collections. There are considerations that need to be addressed, however, before committing to such a procedure. In addition to the costs associated with implementing online TOC, the impact of adding the tables of contents is not well known.

The study described in this article was designed to

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find out whether enhancing online bibliographic records for books by adding TOC would increase usage. By the late 1980s, most information professionals realized that money for materials was shrinking, while prices and electronic resources were escalating. Online TOC appeared to be a reasonable way to increase the use of materials already in the library. However, there was very little formal evidence in the literature about the impact of TOC and even less about the effect of TOC on usage.

PREVIOUS RESEARCH

The research about subject enhancement for books can be generally described in three phases: exploration, implementation, and impact. Both exploration and implementation with TOC have been well represented in the literature, but impact is only now beginning to be studied.

Exploration

The early literature that spurred interest in additional access to library collections began in the late 1970s. Tables of contents have been around for hundreds of years without their presence engendering much excitement among librarians. An interest in experimenting with the addition of tables of contents to enhance catalog records, however, was sparked by Atherton's classic Subject Access Project (SAP) report [1] and later expanded by several important online public access catalog (OPAC)-analysis studies [2-6].

These early studies laid out the issues for designing and implementing online TOC for books. The initial SAP done at the University of Toronto Libraries and sponsored by a grant from the Council on Library Resources was of great importance in laying out the major issues that would continue to influence subject enhancement (including TOC). The SAP study, based on ninety searches and conducted on approximately 2,400 titles from the humanities and social sciences, established the first figures relating increased terms due to enhancement and a resulting decrease in precision. The SAP report also studied what percentage of a book collection could be enhanced, what the cost of inputting subject descriptions in a database was (about \$5.00 per title), and what benefits were derived from online searching of the BOOKS database (benefits such as increased access, greater precision, less costly online searching than MARC searching, and ability to answer questions that MARC searching could not address).

In another important area in establishing parameters for enhancement, Cochrane found that 90% of the books selected for the study could be enhanced. In her study, enhancement involved adding approximately thirty terms from contents and indexes for each book and then examining retrieval [7]. Fifty relevant items

were retrieved from the database having only the standard MARC fields, while 130 relevant items were retrieved from the enhanced (BOOKS) database. Only fourteen relevant items were retrieved by both databases. Precision was 35% for MARC searching and 46% for BOOKS searching. The difference in precision among the databases was not significant [8].

A subsequent study by Markey and Calhoun [9] added important pieces of information: the number of unique words provided by different enhancement choices. The enhancement types were: (1) subject headings, contributing an average of 4.15 words per record; (2) contents and summary notes fields, contributing an average of only 0.42 unique words; and (3) terms from the Dewey Decimal Classification (DDC) Relative Index, contributing 9.16 unique words.

The percentage of unique terms for TOC and summary notes increased in a second study. Because the number of records with TOC or contents summaries was very small in the previous study (only 10.82% had these fields), a second analysis was performed on a subset of records using only records with contents or summary notes. The percentages underwent a major change: while subject headings (4.84 unique terms) and DDC (9.16 unique terms) remained basically the same, the contents and summary notes fields contributed 15.50 unique terms. Markey and Calhoun deduced from this study that summary or contents notes occurring in bibliographic records contributed a significant proportion of the unique words [10].

In their landmark study of OPAC use and its implications for future design, Cochrane and Markey found that OPAC users wanted "subject searching improvements, notably online related word lists and the ability to search books' tables of contents, summaries, or indexes" [11]. In addition to determining what users wanted, this study and the study by Markey were particularly important, because they were among the few studies that actually consulted users. The authors employed several methods "to study library patrons' reactions to OPACs, user experiences and behavior, system features, patron use of and reactions to system features, and system performance" [12]. These early studies set the stage for future research in subject enhancement and, to a large extent, dictated the type of research that followed.

Implementation

The response (small at first) to the early studies gained momentum with the widespread implementation of OPACs. As more OPACs were implemented in libraries, interest in finding ways to enhance OPAC records increased. In the early 1980s, Mandel and Herschman [13] described the increase in searching power due to online catalogs and suggested ways of enhancing online catalog records: adding more subject headings,

providing special thesaurus terms, updating and distributing online versions of the Library of Congress Subject Headings (LCSH), browsing by classification, exploring better user interfaces, and undertaking further study of the relation between the bibliographic record and actual subject searches.

Several years later, Van Orden [14] raised similar issues as program director for research and academic libraries at OCLC, emphasizing the need for including content-enriched access to electronic information:

With the continuing increases in computer processing and storage capabilities, the barriers to and benefits of electronic access to more information content are becoming serious issues in information science research. . . . Well-selected content components and full-text materials in electronic systems must be linked with improved search methodologies, better computer interfaces, and greater understanding of the structure and use of knowledge [15].

Researchers and practitioners responded in several ways. Much of the response to enhancement focused on identifying and studying potential problems that might result from enhancement (including the effect on precision, ways to select items for inclusion, and costs). A handful of enterprising libraries undertook the task of enhancement and implemented SAP procedures; others added tables of contents for their library collection as a whole; and still others selected one or more collections for enrichment within the library [16–19]. Two other studies in this group took place in medical libraries [20, 21].

The largest group of studies focused on exploring different approaches to subject enhancement, often including TOC as an option [22–30]. Tables of contents, although only one avenue of subject enhancement, were studied as a primary enhancement in several studies [31–34]. Identifying the percentage of the collection that could be enhanced, estimating the costs of inputting TOC data, and determining the impact of precision were the main topics of concern in subject enhancement using TOC. Several researchers established ways of identifying the percentage of a collection that might be enriched [35–38]. Other investigations discussed the effect of enhancement on precision [39–42]. None of these studies dealing with subject enhancement, however, focused on the impact that tables of contents had on the use of books in the collection.

Impact

Only one study (Knutson's study published in 1991) formally attempted to assess the effect of tables of contents on usage [43]. Knutson's study, however, belonged in the wider context of a growing interest in the impact of TOC. The general impact of online TOC for books was informally reported in several studies. In 1992, Wittenbach acknowledged that "the use of ta-

ble of contents is receiving widespread attention in the profession" and that studies based on SAP procedures as well as other projects that added table of contents data to the MARC record confirmed that this type of enrichment was "a highly successful method of record enhancement" [44].

In a 1990 study focusing not on enhancement but rather on searching behavior, Belkin et al. noted

a number of instances of users going to the shelves, . . . taking books down and looking at the table of contents and/or index, and then either replacing the book or keeping it. When questioned . . . users often indicate that they are attempting to find out if that book actually treats the subject in which they are interested at all, or in any significant way.

The authors suggested that OPACs should perhaps contain TOC or indexes for scanning by users [45].

Byrne and Micco, using the 1,690 titles in the Australian Defence Force Academy catalog, studied the effect of enriching the catalog with additional contents terms from indexes and tables of contents. They found that "use of contents terms is a viable and cost-effective technique for dramatically increasing the number of subject access points to the contents of books without a serious increase in false drops" [46].

Knutson [47, 48] designed two separate experiments that studied the impact on circulation of various access points (e.g., the number of subject headings for each record). Although neither study focuses specifically on TOC, Knutson's 1991 study included TOC as an access point, and it constituted one example of a formal evaluation concerning the impact of subject enhancement. This 1991 study, conducted at the main library of the University of Illinois at Chicago, added subject headings and contents notes to online catalog records for a group of previously uncirculated social-science essay collections. Circulation was monitored for more than one academic year. A total of 291 titles classed in the Library of Congress schedule "H" (social sciences), added to the collection in 1986, were selected for the study. The 291 titles were limited to essay collections and to conference proceedings that contained discrete parts to which subject headings could be assigned. Only uncirculated titles were considered for enhancement. The treatment group of records got subject headings and TOC data; the control group got no added subject headings or TOC; a third group was enhanced with TOC but received no extra subject headings. The records were stratified by call number and randomly assigned to each group. An average of five additional subject headings were added to the treatment group records. All three groups were monitored, and a shelf check was made once per quarter to ensure there were no problems with the books in the study (e.g., lost or missing copies).

In discussing the results of his study, Knutson com-

pared online catalog use for the year with the circulation for each of the study groups. He found that the circulation of the groups followed the general patterns determined by the academic year. During the year, 19.6% of the 291 titles (57 items) circulated at least once (98 total circulations). Of the fifty titles that circulated locally, 46% of the titles (23 items) were in the subject-enhanced group, as compared to 28% of the control, and 26% of the TOC-only group. A chi-square test, however, found the differences not statistically significant at the 0.05 level. The fact that the sample size was very small might have negatively affected statistical probability. The Pittsburgh study [49] indicated that materials uncirculated after six years probably will not circulate, so Knutson's results did indicate activity that was unexpected. The combination of additional subject headings with TOC appeared to increase circulation at a greater rate than either TOC alone or no enhancement at all.

Knutson's study failed to show a significant increase in circulation when bibliographic records were enhanced with TOC only (i.e., no additional subject headings were added). Not only did the TOC group show no increased circulation, but as Knutson reported: "The contents note group in fact had the lowest local circulation by all three measures. This was a small difference from the control group . . . but the result was unexpected and indicated a need for further investigation of keyword searching on the public catalog" [50]. Without additional information from users who did or did not choose to check out the materials or from additional studies on the impact of TOC, it is difficult to explain the results other than by the small sample size of Knutson's study.

PURPOSE OF THE STUDY

The purpose of the research project described in this study was to determine if books with online tables of contents in the OPAC were used more often than books in the OPAC that did not have tables of contents online. In order to know something about the books that did circulate and those that did not, the books were stratified and randomized for year of publication, circulation status (circulating or non-circulating), broad subject, and TOC or no TOC. Approximately 4,010 bibliographic records for books were tracked during the study. The study took place at the Health Sciences Center Library at the University of New Mexico and was funded through a grant from the Research Committee of the South Central Academic Medical Libraries (SCAMEL). The study began on April 1, 1997, and lasted for fourteen months.

BACKGROUND

At the time of the study, the Health Sciences Center Library at the University of New Mexico had approx-

imately 55,000 book titles. The online catalog that displayed the bibliographic records for books was a text-based version of the InnoPac system from Innovative Interfaces, Inc. Online tables of contents for books were available through the services of Blackwell North America, Inc. (BNA), under their MARC Enrichment Program. BNA electronically scanned and captured TOC for most books that it received as part of its approval and new title services. Selection focused primarily on high distribution monographic titles published by university, science-technology, trade, and specialty publishers of interest to academic institutions. The BNA service had TOC available for materials with imprint dates ranging from 1991 to the present and included all subjects.

Approximately 4,010 titles from the collection (out of approximately 55,000) could be matched with online tables of contents from BNA. The TOC was displayed in the 970 field and was formatted to look like a table of contents in a book. The catalog displayed search results alphabetically for title searches and for word (keyword) searches and alphabetically by last name for author searches.

METHOD

The stratified randomized sampling technique was used to create two files of bibliographic records (Figure 1). One file contained 1,979 stratified and randomized bibliographic records enhanced with TOC (TOC-A), and the other file contained 1,978 records not enhanced with TOC (TOC-B). Once the 3,957 titles identified as TOC or non-TOC were tagged (in the Bcode field in InnoPac), the records were added to the catalog. No other records in the catalog were enhanced—the two groups remained unique in the online catalog for the duration of the study. Statistics on both circulation and inhouse use were captured for the 3,957 titles at monthly intervals and imported into an Excel file for future analysis. Prior to starting the official study (in March and April), the researcher tracked usage for the 3,957 titles in the two groups (TOC-A and TOC-B) but did *not* include enhancement in either file. The purpose was to collect information about how the items in the study circulated when no TOC was present. The tracking process would provide data about previous use. In addition to gaining data on circulation and on inhouse use, we were also able to identify some issues we did not foresee.

Data set adjustments

There were some data set adjustments that needed to be reconciled before the study could begin with the enhanced data:

1. The original file of 4,010 titles that could be enhanced was reviewed to remove some anomalies. Sixty

Figure 1
The TOC stratification process

Because InnoPac is a closed system, standard randomizing of data usually done in a database was not possible. The records could not be taken out of the system, randomized, and then put back to track usage—the system could track usage only within InnoPac. As a result, we had to design a method that was possible under our circumstances.

- An InnoPac review file was created of the approximately 4,010 bibliographic records that could be enhanced with TOC.
- That review file was divided to create files of two location groups: circulating items (locations for books that can be checked out of the library) and non-circulating items (locations for books that can be used only in the library).
(**First stratification:** circulating and non-circulating)
- Each file was stratified by year of publication. (**Second stratification:** year of publication)
- To identify any possible influence on usage due to publication patterns or seasonal variation (especially prevalent in teaching institutions), the titles contained in each year were then further divided into “fourths” and copied into one of two files: with TOC and non-TOC. In an effort to assure that the selection was random, a coin was flipped for each section—A-heads, B-tails—to decide which group each “fourth” was put in.
- A statistical report by call number showed no obvious uneven distribution of subject areas across the two lists, so no additional stratification was deemed necessary.
- The records in the file selected to receive TOC were coded (TOC-A), and the file was sent to BNA for TOC enhancement. The records in the other file were coded to identify them as non-TOC (TOC-B), and they remained in the online catalog unenhanced with TOC.
- The breakdown of each group included equal numbers of titles for each year and for circulating and non-circulating items. Use statistics were captured automatically by InnoPac each month for these titles and read into an Excel file.

serial titles were removed from the study, because they had no call numbers and could not be included for subject analysis.

2. Titles put on classroom reserve during this period (127) were removed from the study, because their use was determined by assignments.

ANALYSIS AND RESULTS

A logistic regression model was designed to identify whether an item was used (either circulation or in-house use) during the study. The response variable for this analysis was USED, which identified whether an item was used at least once or was not used, during the twelve-month study period. In order to determine what factors might have an impact on the chance of an item being used, we defined a list of features that might influence the probability of an item being used.

- YEAR: treated as a categorical variable with seven levels (1991 to 1997), with data from 1990 excluded.
- BCODE: the binary treatment variable with levels TOC (tables of contents included) or non-TOC.
- CIRC: a binary variable identifying whether an item circulated or not.
- LOCATE: location of item (e.g., Humanities Room), treated as a categorical variable.
- CALLNUM: call number, treated as a categorical variable. The category of call number was defined by the general category (WC, communicable diseases)

rather than by the specific call number (e.g., WC 268, bacterial food poisoning).

- PREUSE: total historical use up to month two of study, on a log scale (InnoPac cumulates use statistics). PREUSE as a predictor allowed the author to assess the impact of the treatment variable (BCODE) on usage after adjusting the response for the number of uses historically. This approach was a traditional analysis of covariance for assessing treatment effects when the response might be influenced by the historical number of hits on an item.

The model was formulated as follows: the response was a binary variable (present, absent) and not a measurement, so it fit a logistic regression model, a common approach for this type of data. A hierarchical backward elimination of effect was used, starting with a model that had all possible main effects and all possible two-factor terms, stopping when each term remaining in the model was significant at the 5% level. The selected model included YEAR, BCODE CIRC, LOCATE, CALLNUM, and PREUSE, as significant predictors of whether an item was used.

After adjustment for YEAR, CIRC, LOCATE, CALLNUM, and PREUSE, the odds of an item being used increase by 45% if the item had a table of contents. Table 1 gives the probability of an item being used given that it has a table of contents (*P*₂) and assuming specific values for the probability of an item being used without a table of contents (*P*₁). For example, if an item had a 0.70 chance of being used *without* a table of contents, a comparable item *with* a table of contents had a 0.77 chance of being used. The probabilities were adjusted for all the factors in the model.

The logistic model above shows an increased propensity for an item to be used given that it includes a table of contents. However, the model does not address how

Table 1
Probability of item use

<i>P</i> ₁	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
<i>P</i> ₂	0.14	0.27	0.38	0.49	0.59	0.69	0.77	0.85	0.93

Table 2
Expected increase in use by year

Year	1991	1992	1993	1994	1995	1996	1997
Increase	-0.1	0.3	0.5	0.8	1.0	1.5	1.7

often a specific item might be used. To answer this question, a multiple linear regression model was built with the total use in the study period as a response. The potential predictors considered were identical to those used in the logistic regression analysis (e.g., YEAR, BCODE, CIRC, LOCATE, CALLNUM, and PREUSE). Following the model-building protocol outlined in the logistic analysis, the selected model included YEAR, BCODE, CIRC, LOCATE, CALLNUM, and PREUSE as significant predictors of the number of uses. The selected model also included four two-factor interaction terms: YEAR*LOCATE, YEAR*PREUSE, YEAR*BCODE, and PREUSE*BCODE. The fit of the model was highly influenced by many cases with extreme use, but the significant factors stayed the same regardless of whether the extreme-use cases were included (which implied that the high-use titles were distributed throughout the titles). The fitted model explained only 35% of the variation in item use.

Because the model included interactions between YEAR and BCODE as well as between PREUSE and BCODE, the expected increase in usage due to the tables of contents depended on an item's age and on the historical use. Table 2 gives the expected increase in use by year, for a typical item.

So, for example, a typical item with a 1996 imprint could be expected to be used an additional 1.5 times in a twelve-month period if it were given a table of contents. Clearly, the largest effect of including a table of contents was for the most recent items.

DISCUSSION AND CONCLUSIONS

The study presents new information about the impact on circulation and on inhouse use when tables of contents for books are added to the online catalog record. Two major questions are posed: (1) Does the presence of online tables of contents for books increase use? (2) If it does, what factors may cause the increase?

Results indicate that tables of contents do increase usage. Results also indicate a correlation in the size of the effect based on the currency of the titles and on the history of previous use. In general, even after adjusting for all of the variables (YEAR, CIRC, LOCATE, CALLNUM, and PREUSE), the odds of a title being used increases by 45% if the titles have online tables of contents, a statistically significant impact.

Books with online tables of contents do not all have the same odds of being used. Two factors affect which

titles are more likely to be used. If a title has a history of heavy usage, it is more likely to be selected when TOC is present; and the more current the title, the more likely it is to be selected when TOC is present.

Another result shows that 31% of the 3,957 titles are not used at all during the study. There are no apparent differences between this group and the 69% that are used. In a study of books acquired during 1993 by the UNM Health Sciences Center Library, Eldredge found that 90.7% of the books were used during a five-year period. Although the 90.7% figure appears very high, the present TOC study finds that 69% of the books in the study circulated and thus supports previously observed high use for the book collection in the HSC Library [51]. Other libraries may have different patterns of use.

The results indicate that for titles either checked out or used inhouse (69% of the titles selected) the presence of TOC increases the odds that a book would be used by 45%. The difference in use between titles with TOC and titles without TOC is numerically small: 73% of titles with TOC are used (1,442), and 66% of titles without TOC are used (1,301). This difference, although numerically small, is statistically significant at the 0.05 level with a 95% level of confidence.

Online tables of contents in book records increases the likelihood of inhouse use by 43%; the presence of online TOC increases the likelihood of circulation by 33%. One possible explanation of why online TOC are more likely to increase inhouse use (as opposed to circulation) is that if a table of contents is displayed, it can immediately tell users that they do not want the book; it is a first level of sorting. However, if the table of contents looks promising, users will frequently go to the book to examine a particular chapter or article before making decisions that affect circulation. Some of the chapters or articles will look promising enough to warrant checking out the book; others will be useful without checking the book out; and some will not prove useful at all. The point is that more books will be used than checked out.

Another possible explanation for the difference in effect on circulation versus inhouse use may be that checkouts are limited to six items whereas inhouse use has no limits.

FURTHER RESEARCH

This study indicates not only that tables of contents have a positive effect on usage but also that currency and previous use influence which titles circulate. Because currency is a significant factor in determining which titles circulate, data based on the collection at the Health Sciences Center Library should not be generalized to other types of libraries. Currency is particularly important in the health sciences. In general library collections, by contrast, less current materials

that are historical and literary in nature (the plays of Shakespeare, for example) are used very frequently. Additional research is needed to examine the impact of online TOC in various library environments.

This study indicates that the most current materials benefit most from adding tables of contents. Thus, if the value of retrospectively adding tables of contents to existing collections is considered, caution should be used in determining how much of the collection really benefits substantially from enhancement by online TOC.

One final issue needs consideration. What this research indicates is that titles with online TOC have a positive statistical effect on circulation and inhouse use. There is no evidence from users, however, about how tables of contents affect their search process, about why they search for or how they find a specific title, about why they check out or do not check out a particular item, or about what use they make of the information they receive from the online TOC. Further research is needed—user-centered research—to determine the value of TOC not only to specific types of libraries but also to a variety of users.

SUMMARY

A review of enhancement issues and of TOC implementation studies indicates that there is no single standard for subject enhancement, and, in fact, there is no need for a single standard. The variety of studies and results indicate that differences in collection and in the information needs of users call for significant variance in parameters for enhancement. This study helps to establish the positive role of tables of contents in online catalogs. The research establishes TOC as a major parameter that can be successfully studied using quantitative methods. The study also provides information professionals with some guidance on when enhancement of TOC is likely to be most effective in increasing the use of existing collections.

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