Convenience or content: A study of undergraduate periodical use

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Word Count: 5883 (including abstract and bibliography)

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Keywords

Academic libraries, library instruction, assessment, periodicals, online retrieval, attitude surveys

Abstract

Full-text periodical databases have changed how students access research materials. Many librarians fear that students favor the convenience of full-text databases over more valuable information found in print periodical literature. To what extent is this true? A study was undertaken at Oakland University to determine how well students mastered the retrieval process for print and full-text articles, and to gather their opinions on the value of both formats. A pre-/post-test instrument was administered to students before and after instruction to measure their knowledge of the library and its databases. A final test, including questions designed to measure student attitudes about the article retrieval process, was administered upon completion of a term paper. Results indicate that many students valued the convenience of full-text articles over the article's relevance, but they also found the overall research process to be difficult. The research students conducted also impacted their test results. Other findings are discussed.

Introduction

Reference librarians at colleges and universities witness the following scenario daily: A student approaches the reference desk, needing five journal articles for a paper (as required by his or her instructor), but does not know where to begin to search for information. The librarian introduces the student to a periodical database that contains some full-text articles in addition to article citations, demonstrates how to identify the full-text articles, and also how to identify those articles that are available in the library's print collection. A few minutes later, the student leaves with a pile of paper in hand—full-text articles printed from the computer—never having set foot anywhere near the library's physical collection, although a number of relevant and valuable articles could be found there.

It is easy to label students such as this one as 'lazy.' But we librarians must remind ourselves that other factors may be shaping our students' research experiences. For one, a library's physical arrangement can be confusing; certainly, our students at Oakland University

(OU) seem to have a difficult time finding journal articles on the library's shelves. Periodicals are arranged by Library of Congress classification, and are divided into current and bound collections, both housed on the fourth floor. As a result, students must complete a number of steps in order to find a periodical in print format. First, they must search a bibliographic database or use a periodical index, then they must be able to search Voyager, the library's online catalog, and interpret a periodical record to determine the holdings and location of the journal issue they need. And even if they master this process, they must then navigate the library's periodical collection on the fourth floor and hope that the appropriate journal issue is in its proper location. Although the periodicals floor is occasionally staffed by a student assistant, in reality researchers face this difficult process alone. Has the library created too many obstacles for these students to overcome?

Both at the reference desk and in formal instruction settings, OU library faculty stress the value of the library's print journal collection. But how successful are we in getting this message across? The authors of this paper attempted to measure OU students' knowledge of the library's databases and the article retrieval process; students' use of print and electronic periodicals; and the extent to which convenient access of information impacts the resources that they choose.

Literature Review

Students have experienced difficulty in identifying and locating periodical articles, and in mastering the library's collection in general. In 1978, Paterson found that students had trouble deciding what "sources to use first in locating periodicals" (p. 227). But besides students' lack of familiarity with periodical reference resources, the physical library itself may act as a barrier to accessing periodical literature (Valentine, 1993). Pullinger (1999) found that many researchers avoided retrieving print articles due to frustration stemming from such factors as: the time commitment necessary for a library visit, the library's hours, the arrangement of the collection, and missing periodical issues. According to Person (1981), students rated the knowledge they

gained of the library's physical layout as one of the greatest strengths of a semester-long library instruction course. Not all students experience difficulty retrieving periodical literature, however. Adalian et al. (1985) determined that library users at California Polytechnic State University efficiently used a Public Serials List in microfiche format to find journals housed in a variety of locations throughout the library. These results, though, seem to be anomalous: even the library staff were surprised at their users' success rate.

Given the problems that students face in accessing the print periodical literature, then, it is not surprising that they turn to full-text databases for most, if not all, of their research needs. Numerous studies have demonstrated users' preference for the electronic format: Valentine (1993) found that undergraduate students "perceived electronic reference sources to be the best option for obtaining fast information" (p. 302). Bane (1995) reported that full-text access and ease of use were the most positive factors of searching a business periodicals database on CD-ROM; in fact, users felt that the CD-ROM product was essential to their research. And Bucknall and Mangrum (1992) noted that ease of use and speed were the most popular features of electronic systems. In summary, according to Seiden et al. (1997), "students chose research methods which would get them in and out of the library as quickly as possible" (p. 11). Seemingly for students, full-text databases have eliminated the need to master the library's physical collection.

Unfortunately, the convenience of full-text periodical databases come at a significant cost. Are students really retrieving quality, relevant materials? Bucknall and Mangrum (1992) found that "ease of use, speed, and printing or downloading….may make searching….simpler or more convenient to use than a printed index, but do not necessarily ensure that the information retrieved is better or more relevant" (p. 546). For many students, content clearly becomes secondary to convenience (Bane, 1995). Seiden et al. (1997) concurred that full-text databases offer one-stop shopping, but searchers, especially novice searchers, do not understand the

structure and complexities of electronic databases. They are familiar with computers but unfamiliar with the information environment.

This unfamiliarity with the structure of information resources may give students an unfounded confidence in their own searching skills (DiMartino and Zoe, 1996). Wozny (1988) discovered that, rather than applying multiple search strategies in a single database, students moved from one database to another using their own search terms until they found a database that gave them results. By ignoring controlled vocabulary terms, students displayed their ignorance of database structure. A misunderstanding of how information is structured and packaged may also lead to a false belief that a single database, or indeed any database, will contain all of the available information on a particular topic; as a result, students who rely solely on full-text information limit significantly their potential research findings. Researchers generally use three techniques to access periodical literature: online bibliographic databases, article references, and browsing journal issues (Pullinger, 1999); Fister (1992) also noted that entering the "citation network"—i.e., following references—is an effective method for undergraduates. But a user who relies solely on full-text databases will not exploit these methods fully, perhaps resulting in weakened information literacy skills.

Full-text database convenience, coupled with the difficulty that students experience in navigating a library collection, has resulted in a significant decline in print periodical use. Lenares (1999) reported that 65 percent of faculty respondents reported frequent use of print journals in 1999—a substantial decrease from 1998. And at the University of North Carolina, 26 percent of U-Search system users, which provides free, remote access to 15 CD-ROM databases, indicated that they would never use print resources under any circumstances (Bucknall and Mangrum, 1992). In fact, some users were "loathe to use the more traditional print format, even when it contains more information" (p. 549). One librarian summarized the full-text searching experience: "Access is great, but patrons are often overwhelmed and don't know

where to start" (Tenopir and Ennis, 1998, p. 86). Perhaps they do not know where to start, but users *do* know they do not want to start with print.

Research Questions

We designed the present study to address the following research questions:

- Following instruction, how well can students distinguish among the library's databases?
- How well are they able to retain this information over the course of a semester?
- Do students' research patterns affect retention?
- What barriers to retrieving print periodical articles do students perceive, and how strong are these barriers to preventing them from using the print journal collection?
- How strongly do students favor convenience over relevance in choosing research materials?

Methodology

During the Winter 2000 semester, we chose 14 sections of Rhetoric (RHT) 160 classes—a mandatory freshman-level writing course—to use as subjects for this study. Students enrolled in RHT 160 must complete an extensive research paper; topics vary by RHT instructor, but generally students are required to use a minimum number of scholarly sources. To assist students with their projects, Kresge Library faculty provide one week of instruction, designed to introduce them to the research process and to the library resources and services available to them. All 14 RHT 160 sections chosen for the study received library instruction from one of the authors.

To assess students' familiarity with library resources, we developed and administered to students a pre-/post-test instrument of 13 questions prior to, and then following, their week of library instruction. The test consisted of 13 questions that asked students to identify the library's

catalog, bibliographic, and full-text databases; to interpret bibliographic records; and to demonstrate their knowledge of the location of materials in the library. We also gathered information on students' class standing, previous library instruction experiences, and their frequency of library visits. Students were allotted as much time as they needed to complete the tests, and most students finished within five to ten minutes. Prior to administering the test, we field-tested the instrument on two other RHT sections, and reworked questions for clarification.

In addition to the pre- and post-test, students were given a final test at the end of the semester, this time administered by their RHT instructors on the day that students handed in their completed research papers. This final abbreviated test comprised eight questions from the original instrument, plus questions designed to elicit students' opinions on the convenience and value of print and full-text resources, and on the research process in general. These questions consisted of Likert scale and open-ended questions.

The study began with approximately 260 students; however, due to student attrition and absence, a varying number of students completed each test. Additionally, we eliminated from the sample all test results from one RHT section when the RHT instructor failed to return students' completed final tests. It should also be noted that we asked students to provide the last four digits of their student identification numbers on each test so that we could link their results from the pre-test through the final test. Unfortunately, many students failed to provide this information; as a result, we were able to match the pre-test and post-test results of only 165 students, and the results of only 111 students could be collated for all three tests.

All of the tests were graded and the results were entered into the SPSS 10.0 statistical software package for statistical analysis.

Results

Pre-test Results

A total of 258 students completed the pre-test prior to any instruction. Pre-test scores ranged from one to eleven correct answers, with a mean score of 6.86. For the purposes of this study, answers left blank were assumed to be incorrect, since students had as much time as they needed to complete the test. The calculated kurtosis and skewness of pre-test results (.411 and -.124 respectively) indicate that the results approximate a normal distribution.

Table I details student performance on the pre-test, compared to post-test and final test results. As the table illustrates, students experienced great difficulty in distinguishing among the library's various databases. In fact, when asked to choose from a list the databases that contain citations to journal articles (question 2), only one student identified all of the appropriate resources. Students had similar difficulty in naming the full-text databases (question 9).

Take in Table I

In comparison, students fared better answering questions about the Voyager catalog. As Table I reveals, many students were able to interpret the Voyager holdings record for a periodical (question 5a). And even without instruction 77.1 percent (n=199) of the subjects knew, or could intuit from the Voyager bibliographic record, the location of current journal issues in the library (question 5b). Over one-third of the students also correctly identified Voyager as the appropriate database to find a book in the library (question 1).

Previous library instruction seems to have had some effect on student performance on the pre-test, as revealed by chi square analysis (chi=6.297, df=2, p=.043). Although only 14.2 percent of the subjects (n=36, with four students not answering the question) had received prior instruction, these students were more likely to achieve a higher overall score: 50.0 percent (n=18) of the students who had received instruction scored between 8.0 and 10.0 on the quiz,

while only 29.4 percent (n=64) of the students who had not received previous instruction scored within this range.

Post-test Results

Post-test scores reveal a marked difference following the week of instruction. A total of 249 students completed the post-test, and their mean score was 10.24. Again, the calculated kurtosis and skewness of the post-test results (.221 and -.630 respectively) indicate that the results approximate a normal distribution.

To determine whether the change in scores from the pre-test to the post-test was statistically significant, we performed a paired-samples t-test. We used students' identification numbers to match 165 post-tests to their respective pre-tests. Because the mean post-test score (10.36, s=1.78) for these 165 subjects did not differ significantly from the mean score for all subjects, we used this smaller sample to analyze score improvement. For the 165 paired-test subjects, then, the mean change in score was 3.42 and, at a 95 percent confidence level, the mean improvement in post-test scores is assumed to be between 3.15 and 3.70. The results of the paired-samples t-test ($t=24.65$, $df=164$, $p<.005$) support the hypothesis that a significant change in test scores occurred following instruction.

As shown in the results for individual questions on the post-test (Table I), students demonstrated marked improvement in their knowledge of the Voyager catalog as well as the library's physical layout. In fact, when asked to identify which database they would use to find a book in the library (question 1), almost 80 percent of the students answered correctly. There was also a 37.0 percent increase in the number of students who correctly chose Voyager to find a periodical's call number (question 3). And over 70 percent of the students correctly located circulating books on the third floor (question 4).

However, students still failed to identify periodical databases properly. More than half of the subjects could not determine which databases contain journal article citations (question 2).

Nor could they identify the databases containing full-text articles (question 9). Almost all of the students, however, correctly disagreed with the statement, “All articles found in print in the library are also available full-text on the Internet,” an improvement of 21.5 percent over pre-test results.

Final Test Results

A total of 239 students completed the final test at the end of the semester, after completing their research papers. Because only a sample of the questions from the pre-/post-test instrument appeared on the final test, a perfect score on the final test was 8.0. The mean score for the final test was 4.52. As on the previous tests, the calculated kurtosis and skewness (-.219 and .038 respectively) indicate that the results approximate a normal distribution.

We compared students’ performance on individual questions to pre- and post-test results in order to measure students’ retention of information introduced during instruction (Table I). And once again students scored comparatively well on those questions that tested their knowledge of the Voyager catalog. In particular, 66.9 percent of the subjects knew to use Voyager to find a book in the library (question 1)—a lower percentage than those who answered the question correctly on the post-test, but still higher than pre-test results.

For questions 5a and 5b, in which we sought to measure students’ ability to interpret a Voyager periodical holdings record, we used a different journal for our example on the final test, and also asked students to identify the location of a bound—not current—periodical volume. Consequently, student performance on these two questions cannot be compared properly with pre- and post-test results. Yet it is interesting to note that students scored worse on question 5b on the final test than on both previous tests. Since one of the possible answers to this multiple-choice question was “4th floor, Current Journals Room,” students may have focused on “journals” in this answer, thus accounting for the high percentage of students who answered 5a correctly on the pre-test, but incorrectly on the post-test. In any case, we will need to undertake

additional research to determine whether, in fact, students are able to interpret periodical holdings information.

The same questions about periodical databases—questions 2 and 9—continued to plague students in the final test. Still, even if students could not identify the full-text databases, most (82.4 percent) understood that not all articles could be found online (question 8).

On the final test, in addition to the factual questions, students were asked to complete a few questions about their research project. Their responses reveal that 120 students (50.4 percent) had attempted to find a print journal in Kresge Library, compared to 203 students (84.9 percent) who had tried to find a full-text article from one of the library's databases. And of the students who looked for full-text articles, almost half (n=93, 45.8 percent) limited their research solely to the full-text periodical format; in contrast, very few students (n=11) searched only for print articles.

Students' research activities seem to have impacted their test performance. Table II summarizes final test results by the resources students at least attempted to use in their research. Although the number of students who searched only for print is very low, nonetheless these students tended to score better on Voyager and location questions (questions 1 and 4) than students who searched only for full-text articles. Conversely, students who looked only for online articles were more likely to believe—incorrectly—that all journal articles are available online (question 6). Overall, though, students who searched for both print and full-text articles performed better on the final test, as their mean score of 4.93 indicates. It should be emphasized, however, that so few students searched only for print articles, or searched for neither format, that these results should be read with caution.

Take in Table II

We also asked students to rate—on a five-point Likert scale (“Very Easy” to “Very Difficult”)—the ease of finding print and full-text articles. While only 20.9 percent (n=26) of the students who looked for print articles rated the process as a 4 or 5 ("Difficult" or "Very Difficult"), this is almost double the percentage of students (10.7 percent, n=22) who gave the same rating for full-text article retrieval. A follow-up question elicited students’ comments about the article retrieval process; Table III summarizes these comments. Those who had attempted to find a print article noted the usual problems and tended to be negative about the process. Not all students were discouraged by their experiences, however: although the periodicals floor is not staffed regularly, students who received help from a staff member acknowledged this assistance. In contrast, students expressed a more positive attitude regarding full-text article retrieval.

Take in Table III

Chi square analysis (chi=9.536, df=4, p=.049) reveals that, in general, those students who attempted to find both print and full-text articles rated the difficulty of both retrieval processes similarly. For example, 89.2 percent (n=33) of those who rated the print article retrieval process as a 1 or 2 ("Very Easy" or "Easy") rated full-text article retrieval equally. It seems, though, that students were more likely to have trouble with the print retrieval process: only 60.0 percent (n=15) of those who rated print article retrieval as a 4 or 5 ("Difficult" or "Very Difficult") gave the same rating to full-text retrieval. Using the same Likert scale, we asked students to rate the ease of library research in general. The results of this question matched the ratings for print and full-text article retrieval: 91.4 percent (n=74) of those who rated library research as "Easy" or "Very Easy" rated the full-text article retrieval processes in the same way. The same tendency held true for print article retrieval.

We designed five final test questions to elicit student opinions on the value and convenience of print and online formats. On a five-point Likert scale ("Strongly Agree" to "Strongly Disagree"), students responded to a series of five statements; Table IV summarizes students' reactions. As shown in the table, the most strongly positive feedback came in response to the first statement, "Having online, full-text articles available to me is important." Student opinion appears more split in reaction to the second ("If I find a citation to an article that is not full-text online, I will ignore it rather than find it on the 4th floor") and fifth ("Everything I needed was available online") statements.

Take in Table IV

Naturally, a relationship exists between students' research experiences and their responses to these statements. For example, 47.5 percent (n=57) of the students who attempted to find a print article did not believe that all of their needed research was available online (question 12e). And only 30.0 percent (n=36) of the students who attempted to find print articles agreed that they would disregard a citation to a print article (question 12b). Importantly, chi square analysis (chi=11.226, df=4, p=.024) shows that students who rated the research process as difficult were more likely to favor convenience over relevance in their choice of resources (question 12c): 42.3 percent (n=11) agreed with the statement, "The convenience of locating an article is more important than how relevant it is to my topic," compared to 23.1 percent (n=6) who disagreed.

Discussion

A number of conclusions may be drawn from these results. First, this study supports those researchers (Fry and Kaplowitz, 1988; Wozny, 1988) who have found that instruction does, indeed, improve students' knowledge of library resources. In the present study, students

who received instruction prior to the pre-test scored higher than those students who had not; furthermore, the significant improvement in scores from the pre-test to the post-test supports the effectiveness of instruction, at least for a short time. However, as student performance did decrease on the final test, we may conclude that retention is limited, both in duration and in the amount of information retained.

In general, students performed better on those questions that related to the type of research they had accomplished. Students who had to use Voyager to find the call number of a print periodical for their actual research were more likely to answer this question correctly than those who had no need to do so, while students who searched exclusively for online articles were more likely to be able to identify the library's full-text databases. But students who searched for both article formats scored better overall than for those who looked for just one article type. These results support the belief that experience reinforces learning: although all students received hands-on practice using Voyager, the process of finding print and online articles to satisfy a real information need (i.e., a research paper) seems to be a more valuable experience.

Not surprisingly, students in the present study rated the process of finding print articles more difficult than finding online, full-text articles. Even students who attempted to find print articles preferred using the electronic format. Certainly added effort is needed to locate, and probably photocopy, a print article when all one needs to do is hit the print key to obtain a copy of a full-text article. And the added convenience of remote access to full-text databases allows students to remain in their dorm rooms or at home and still find the information they need. In fact, almost half of the students relied only on full-text articles for their research. However, from both students' comments and test performance we may assume that it is not just laziness driving students to rely solely on online information. Rather, students experience significant difficulty in all aspects of locating print articles in the library: identifying call numbers, locating the journal in the library, finding the volumes that they need. According to our survey, students

value the relevance of articles over the ease with which they may be accessed; however, if they will face obstacles in obtaining valuable print resources, then who can blame them for relying on full-text databases for their information?

Unfortunately, this reliance on full-text databases to satisfy all information needs creates its own set of research problems. As our research has shown, students who relied solely on full-text articles were more likely to believe that they could obtain all articles online. However, some full-text databases contain a number of popular, less scholarly, sources, making it difficult for students to weed through hundreds or thousands of articles to find the most valuable and appropriate information. Additionally, Oakland University's full-text databases tend to cover the humanities and social sciences better than the sciences. As a result, students searching for scholarly, full-text articles in certain subject areas may not always be successful, just as our students' comments illustrated. This misunderstanding of the information environment gives students the false sense that they need only search a full-text database to find everything they need; as a result, they fail to identify important print resources.

Further complicating this scenario is the fact that, according to researchers like Wozny (1988) and Seiden et al. (1997), students experience significant difficulties in searching for relevant information in databases, especially full-text databases. Students in our study reported that they could not find any articles on their topic. While it may be true that relevant articles were not available full-text, it may also be just as true that these students did not use effective search strategies to find information. Even if the information is contained within the database, students may not be able to access it by themselves because they rarely master the skills necessary to search the database successfully.

Students who use full-text databases exclusively also are ignoring other excellent research methods that tend to rely on print resources, such as citation searching and browsing. Because coverage of many full-text databases is fairly recent, students cannot follow the scholarly communication that is created over time. And since most databases do not contain

hyperlinked citations, students probably are less likely to use citation searching to identify relevant information.

Our research suggests that students are, indeed, encountering these problems when using full-text databases. Importantly, students who found the research process difficult were more likely to favor convenience over relevance in their choice of article format. Perhaps, in relying on full-text databases for their resources, these students encountered difficulty in finding articles online that met even the basic requirements of their paper. Yet students remain strong in their preference for using articles from full-text databases, favoring a quick trip to the library—or perhaps never leaving their home or dorm room—over finding relevant, appropriate information. Until all the information that is contained in the physical library is also available *and* accessible electronically, with hyperlinked footnotes and references to enable citation-chasing, then students who rely solely on information they glean from full-text resources are cheating themselves, through their preference for convenience and in their confidence that they can find all that they need online. They are destined to be frustrated researchers.

It would behoove Oakland University library faculty and staff to remove as many obstacles as possible from the print article retrieval process. For example, full-time staffing of the fourth floor—where journals are located—may alleviate some of the physical barriers to finding needed periodical volumes. And perhaps library faculty should rethink the classroom exercises students are asked to complete for RHT 160, and require students to physically experience this process for themselves by leaving the classroom and finding an article on their own after having identified its call number and location. This could enable students to grasp and master the print article retrieval process.

Furthermore, our research points to the value of class assignments that require students to find and use both print and online information. In fact, one RHT instructor, in a casual conversation, mentioned that she is contemplating making such a requirement for her future RHT 160 students. In many cases, though, faculty require a minimum number of scholarly

sources for an assignment without emphasizing the need for thoroughness in the research process. Without this emphasis on research quality, students profit from only part of their research and writing experience.

Of course, it is likely that as librarians, we expect too much of the first-year student, and we need to temper our belief that students master the entire research process early in their academic careers. And, in fact, at Oakland University we are attempting to do just that. Instruction librarians recently reevaluated the goals and learning objectives for RHT 160 library instruction, since it was obvious that students were overwhelmed by the number of resources available to them, and librarians were hard-pressed to introduce students to these resources in a limited timeframe. Perhaps it is enough for first-year students to find a few relevant scholarly articles online.

An unfortunate fact, however, is that many of these students will not receive any further library instruction in upper-level subject courses. Although library faculty have stressed to their colleagues in academic departments the importance of course-integrated library instruction, their efforts remain only moderately successful. As a result, librarians feel pressure to introduce advanced research concepts during instruction to first- or second-year students. If they fail to do so, then these students may never grasp the importance of print resources in conducting more sophisticated disciplinary research. It would be advantageous to repeat this study with students in advanced subject courses, to determine whether these students exploit more completely all avenues of research, whether print or electronic. At the same time, librarians must continue to emphasize to teaching faculty the importance of instruction of advanced research skills to their students. Certainly, this study has demonstrated the clear need for a comprehensive library instruction program that permeates the entire curriculum, and not just freshman writing courses.

Conclusion

It could be argued that students' test performance was not a true measure of their research abilities. However, we developed the test questions keeping in mind the basic information students would need to know in order to find both print and full-text articles in Kresge Library. Obviously, we must continue to work toward developing the information literacy skills of our students. Moreover, it is crucial for us to remember, before we label them as 'lazy,' the difficulties students face in identifying and locating print resources.

Libraries are in the midst of great change as information migrates increasingly to electronic formats. And having online information--accessible anytime, anywhere--is where our students expect libraries to be. Unfortunately, their expectations are beyond the current reality. Perhaps it is only a matter of time before libraries offer unlimited electronic access to the breadth of human knowledge. In just the past few years, we have witnessed the development of electronic journal and book databases such as *JSTOR* and *NetLibrary* that have expanded significantly the resources available online to researchers. Certainly, services such as these bring us closer to meeting the expectations of our customers. However, electronic coverage of periodical literature is still more complete in some disciplines than in others, so that where full-text access is shallow, the existence of these full-text resources actually complicates the research landscape. The full-text database has not replaced the print literature, but instead has become one more source of information to consult.

Of course, with the growing availability of these full-text resources, librarians will need to conduct instruction online through web tutorials and other electronic means to assist students struggling with their research from off-site--not just to support students enrolled in distance education courses, but also for traditional students who simply want to do their research without having to enter the library. While the mode of instruction may change, the need for instruction remains. But until everything is available on the Internet, librarians still need to instruct students in finding and using good old-fashioned print resources. And perhaps the most important outcome of library instruction, at this time, would be for students to understand the possibilities

and limitations of the current information environment, and to be able to evaluate effectively the information that they find. In this way, we may improve their efficiency as researchers: they would be less likely to waste their own time looking for full-text information when perfectly good information is available in print.

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