Electronic Book Usage at a Master's Level I University: A Longitudinal Study

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From 2000–2004, the Auburn University Montgomery Library measured electronic book usage. Electronic book usage increased while use of the printed collection decreased. Subject areas most used resembled those reported by larger institutions, supporting the idea that some subjects are amenable to electronic use regardless of institutional size and mission.

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Founded in 1967, Auburn University Montgomery (AUM) is a Carnegie Master's Level I intensive institution with an enrollment of 3694 FTE students. Of this total, some 400 are graduate students at the Master's level. The University operates three joint doctoral programs (Public Administration, Educational Leadership, and Audiology) with the Auburn University campus. The University consists of six schools, Business, Continuing Education, Education, Liberal Arts, Nursing, and Sciences. Currently, the AUM Library holds over 330,000 books, 5000 videos, and over a million government documents. Additionally, its catalog includes subscriptions to over 40,000 electronic titles. Records for all collections are routinely included in the online catalog.

In Spring 2000, the Auburn University at Montgomery Library purchased access to the first of four shared netLibrary collections, available through the Southeastern Library Network (SOLINET) cooperative program.[1] Between 2000 and 2004, access to all four of the collections, designated the Solinet Shared Collections I, II, III, and IV, was purchased; the items in these collections were selected by netLibrary, based upon evaluations of similar institutions participating in the OCLC SOLINET group.[2] From the beginning, efforts were made to include these records in the online public access catalog to facilitate user access. The netLibrary collections were incorporated into the library instruction program as an additional means to facilitate usage. During this time, the AUM Library chose not to purchase access to individual titles in netLibrary, relying upon the materials available in the four shared collections; no additional electronic books or copies of electronic books already in the collection were purchased, as no data existed regarding the popularity of the electronic collection. After 5 years, data exist to evaluate AUM patrons' usage of these collections and compare that usage to that of other institutions. The data show a steady increase in usage across several subject areas, denoting growing acceptance of electronic monographs among the users of the AUM Library.

Literature Review

A focus on electronic book usage over time allows examination of a much smaller set of the overall literature regarding electronic media usage.

Gibbs[3] provides an article in late 2001 detailing the results of an experiment with electronic books at North Carolina State University (NCSU). With no large-scale marketing of the netLibrary holdings and without putting these holdings in the

NCSU online catalog, users found them serendipitously. Once bibliographic records for the netLibrary titles were placed in the catalog, use increased. Among the most popular subjects were computer science, technology/engineering, economics/business, medicine/health/wellness, literature, and philosophy. Gibbs studies usage data throughout the semester, month by month, rather than taking the data from an aggregate period of time, such as a year. This provides insight into the use of the netLibrary collections, showing a repetition in pattern of use through the spring and fall semesters not present in the summer semester. An important point made is that, for electronic books to be used, libraries must include bibliographic information for the electronic books in the catalog just as they would a printed book; the online catalog serves the purpose of leading readers to the material, regardless of format.

Gibbons[4] describes two early studies of electronic book use at the University of Rochester in an attempt to reach conclusions as to the value of e-books and to provide recommendations for the development of the netLibrary collection. These recommendations can be extrapolated to general use among institutions wishing to develop electronic collections. Data are presented describing the subject areas, as defined by netLibrary, used by patrons of the University of Rochester Library. Among the most used areas are economics and business; computer science; technology and engineering; psychology; medicine, health, and wellness; literature; anatomy and physiology; sociology; and education. Data on the least used subject areas appear to no longer be available.

Dillon[5] considers usage of the University of Texas at Austin electronic book program reflected by the University of Texas system collection, the Texas Statewide Library collection, and the AMIGOS collection. Dillon explains the selection of the netLibrary collections by the University of Texas; among the reasons for choosing netLibrary were universality of access and the uncertainty of the electronic book publishing market. Dillon reports on the use statistics available from netLibrary, including titles used, titles unused, most used titles, and comparisons between printed book use and electronic book use and comparisons of UT-Austin's patron use by subject among all three electronic collections. The overall data show that economics, business, and computer science were the most used subjects across the collections. Unexpectedly, he finds that the use of electronic books has been relatively scant, reflecting a need to develop these subjects within the UT system collection and enter these titles in the online catalog. Dillon notes that the electronic book, while simply a different format for delivering information, has a "bright future as a means of conveying information."

Dillon[6] considers format differences in a follow-up piece to the previous article. A primary contribution of the article addresses the increased desire for electronic books available through the OPAC. Once accomplished, users made significantly more use of the collections in a time period too short to be explained by other influences. User access patterns also changed during this time, allowing selectors to better tailor the collections to actual user desires.

Ramirez and Gyeszly[7] survey the use of the Texas Agricultural and Mechanical University (TAMU) collection as well as the AMIGOS collection and the Texas State Library and Archives Commission collection, similar to the work done by Dillon.[8] They find little in the literature regarding electronic collection development, with the majority of the literature considering the technological challenges of the electronic book. The article breaks use down by netLibrary-defined subject areas, limiting analysis to the electronic collections. Ninety-day use periods were studied. Among the findings are that business and economics were the most used, with computer science, literature, military science, and American history close behind. Other subject areas each had less than 6 percent of accesses. Use across the three collections broke down similarly. Ramirez and Gyeszly conclude the major advantage of the netLibrary model is continuous accessibility, restricted only by the availability of a connection to the World Wide Web. While there was less use than anticipated for the 270-day period studied, use increased dramatically with the addition of bibliographic records to the online catalog and with increased marketing on the part of the TAMU Library. User attitude surveys regarding electronic formats found that users prefer printed material. The authors offer advice on collection development decisions, including: "the price of electronic books. . . is significantly higher" than that of printed materials; archival needs (purchasing a printed copy as well as an electronic copy) should be considered; patron preferences for either printed or electronic books in certain subject areas, such as computer science, must come into play; and that "more study needs to be conducted in the areas of copyright restrictions."

Langston[9] considers an electronic book pilot project in cooperative collection building conducted by the California State University (CSU) system. Using a total of 23,000 netLibrary titles in two collections (one leased and the other purchased), Langston found that the most accessed subject areas in the leased collection were economics and business, computer science, technology and engineering, sociology, literature, and law. Three areas in the leased collection (fine arts, geography, and military science) had no uses during the period surveyed. In the purchased collection, presumably more tailored to the CSU system, the most used subjects were medicine, health, and wellness; sociology; education; psychology; and family, marriage, and parenting. The least used of the purchased collection were chemistry; zoology; recreation, leisure, and sports; botany; film/media studies; military science; and mathematics. There were no subject areas not accessed at least once during the project in the purchased collection, indicating a better fit of the purchased collection to the CSU system needs. Langston also notes that use by call number "would be more helpful."

Fernandez[10] provides a study of the 2001–2002 year comparing usage of print and electronic works at the University of North Carolina at Chapel Hill. Attempting to determine the worth of such a comparison to collection development issues, he finds that the ten most used subjects for electronic books at UNC-Chapel Hill are social sciences: general; literature; business, economics, and management; medicine; computers; religion; arts; history: world and general; education; and psychology. Employing a methodology similar to that of other authors, he provides a one-to-one comparison of electronic titles and their printed counterparts held by UNC-Chapel Hill. He notes that electronic title usage varied among subject areas, such that literature, for instance, was used 1.5 times more often in printed form, while the titles selected for computers were used 1.5 times more often in electronic format. While the study found that, on average, printed materials were used more often than electronic versions, some subjects did have greater use in electronic format than print.

Littman and Connaway[11] devise their own subject areas for judging use, based on Library of Congress subject headings. While mainly dealing with a direct comparison of print to electronic usage, they do report usage as a percentage of subject area. They find that use of electronic books at Duke University is comparable to that of print books in each subject area considered. The most used subject areas for electronic books at Duke were computers, psychology, medicine, religion, arts, and the general social sciences. The least used subject areas at Duke were history of the United States; law; business, economics, and management; and literature.

Christianson and Aucoin[12] compare the use of electronic and printed books, much as others have. In their study, the duplication of many printed titles by the SOLINET Shared I collection was noted and monthly collection statistics for each format were collected for a year. At that time, the comparisons found that use mirrored the academic year, with higher use for both collections being found toward the end of a term than at the beginning. A difference is found between certain subjects, which the authors offer the cautious interpretation that "when these top subjects are available, they are acceptable in both formats."

Thus, there is sparse literature describing the usage of electronic books in academic settings. Few resources attempt to quantify the use of electronic books for collection development, despite netLibrary providing a narrow range of possibilities for usage measurement. Among these are number of usages, defined by netLibrary as either browses or checkouts, and the number of turnaways, defined by netLibrary as attempts to view eBooks where all copies were in use or the title was not owned by the library.[13] Available reports include popular e-books, activity by title, activity by subject, dusty e-books, turnaway statistics, and dictionary access.

Methodology

Data were gathered from the reports available at netLibrary. The reports used here concern activity by subject. This narrow focus was chosen in order to provide a rough comparison across differing collections, where some electronic collections are more tailored to institutional needs than others.

The first report retrieved dealt with activity by subject. A raw number of times a subject was used for any given time period were extracted and then downloaded in tab delimited format. The second set of reports initially dealt with activity by title for the years 2000, 2001, 2002, 2003, and 2004. These data were saved as a tab delimited file, which was then opened using Microsoft Excel. The number of titles used for a given subject area was counted in order to account for possible multiple uses of a single title in a subject area. This was an effort to both eliminate possible skewing of results by multiple use of a single title and provide a better indication of how useful a given area is to users of the electronic collection.

However, a curious problem was found in the data: netLibrary subject categories do not reflect Library of Congress subject headings. This makes comparison at any level above a straight title:title comparison difficult. There is also the difficulty of comparison between reports using netLibrary-defined subject terms and author-defined or Library of Congress-based subjects. Generally, the subject terms reported are similar to those used by netLibrary. Because of the similarity between reported subjects and the netLibrary-defined subject categories, it is possible to compare the use made at variously sized and ranked universities, examining the similarity and difference made between large, doctoral/research institutions (the University of Rochester, TAMU, NCSU, UT-Austin, UNC-Chapel Hill), large system/consortium users (the California State University system), and the use made by a smaller, Master's Level I institution such as AUM. Additionally, many of the institutions reporting data found a steady increase in use over time.

Carnegie Rankings, a basis for institutional comparison, are available at http://www.carnegiefoundation.org. The Carnegie Foundation for the advancement of teaching is a privately operating foundation awarding no grants; rather, the foundation seeks to advance teaching at all levels through a variety of programs. In higher education, a principle effort of the foundation is to provide the Carnegie Classification of Institutions of Higher Education. Described as "the leading typology of American colleges and universities" and the framework in which institutional diversity in US higher education is commonly described, the classification provides an easy means of comparison for a study such as this. Conveniently, the institutions being compared fall into either the Doctoral/Research Universities–Extensive, granting at least 50 doctoral degrees per year within at least 15 different disciplines, or the Master's Level I, awarding 40 or more Master's degree's in three or more areas.[14]

Results

During the time period surveyed, records indicate that printed book usage entered a period of decline, followed by a slight increase in usage for materials between the years 2003 and 2004. Comparatively, electronic book usage, as reported by netLibrary, began increasing. Overall, print usage declined by almost a third during this time period, while electronic book usage increased between three- and fivefold (see Table 1, below). Possible reasons for the decline in printed materials include an aging collection and an increase in computer savvy library users, though such speculation is beyond the scope of the present study.

While this growth over time of netLibrary use, at a greater than threefold increase each year, is clearly not sustainable, it is promising and demonstrates that the netLibrary collection has become an established and accepted part of the AUM Library's collections. Such growth, when compared with the generally declining or somewhat flat use of the printed collection for the same period of time, indicates that additional netLibrary or electronic collection development efforts could prove worthwhile. The AUM Library collection policy focuses on content, not format, of materials. The integration of electronic resources into the collection policy occurred seamlessly, allowing the purchase of large broadly based collections to augment the existing print collection.

Table 1
Print vs. Electronic Book Usage, AUM Library

	Print Usage	e-Book Usage	% of Use, e-Books
2000	36,471	30	0.08
2001	32,110	103	0.32
2002	27,612	786	2.85
2003	23,922	1908	7.98
2004	24,089	5534	22.97

Over time, it can be demonstrated that use of the electronic collections at AUM increases in all subjects, though some subjects increase in use at a faster pace than others. This in itself is noteworthy, although whether this says more about the type of material which lends itself to online use or the sort of patron most likely to use online materials is difficult to say. Indeed, Langston[15] and Gibbons[16] acknowledge the need for greater information about the user, rather than the simple fact an item is used, in order to make judgments of collection value. Table 2 shows the five most used subjects at AUM: business, economics, and management; computers; literature; social sciences: general; and medicine. Many of these subjects may lend themselves to quick reference-style look-ups as Dillon[17] notes. However, given the sort of data that netLibrary provides, it is difficult to draw such a conclusion. One indicator of user behavior is the close match between the total number of

Table 2
e-Book Subjects Used by AUM Patrons

Subject	Accesses in 2000	Accesses in 2001	Accesses in 2002	Accesses in 2003	Accesses in 2004	Total Accesses
Business, economics, and management	4	24	112	432	1008	1580
Computers	0	3	24	174	1080	1281
Literature	5	15	151	316	736	1223
Social sciences: general	3	20	132	261	645	1061
Medicine	1	10	87	102	389	589
Law	0	1	11	52	203	267
Education	1	12	23	44	177	257
Arts	3	1	9	71	172	256
History: world and general	4	0	14	33	135	186
Philosophy	1	0	16	40	115	172
Home economics	2	4	16	38	93	153
Religion	1	0	13	58	78	150
History: United States	1	4	30	45	60	140
Psychology	0	0	24	23	87	134
Political science	0	2	7	28	97	134
Sports and recreation	0	0	5	18	93	116
Language and linguistics	0	0	13	29	49	91
Biology and life sciences	0	1	11	12	59	83
Agriculture	2	0	16	26	32	76
General works and reference	0	0	7	25	42	74
Technology, engineering, and manufacturing	0	1	13	21	36	71
Library science and publishing	1	4	12	11	32	60
Networking and telecommunications	0	0	2	8	35	45
Travel and geography	0	0	20	2	13	35
Mathematics and statistics	0	0	1	6	27	34
Other	1	0	3	14	14	32
Physics	0	1	3	4	10	18
Science: general	0	0	2	6	7	15
Earth sciences	0	0	6	6	2	14
Chemistry	0	0	1	1	6	8
Sociology and anthropology	0	0	2	2	1	5
Total accesses	30	103	786	1908	5534	
Total checkouts	30	103	786	1908	5533	
Total renewals	0	0	0	0	1	

accesses and the total number of checkouts. As the checkout period established for netLibrary during this time was two hours, users were apparently not using titles for greater than two hours at one time. While many authors have suggested creating and using an in-house form for self-reporting[18,19], even a simple time-of-usage statistic averaged for each area would provide more data than currently. Breaking down the raw usage numbers for a subject area into the number of title accesses, rather than the number of times a subject was accessed, fills in some important gaps in the data.

Table 3, below, illustrates the growth in overall use of the netLibrary collection. Here the number of titles used is shown in an effort to discover whether a pattern of increasing use of titles emerges to support the increase in number of total uses. It can be seen that the area with the greatest number of titles used mirrors the number of uses from Table 2: business, economics, and management. However, the next few areas of high use in terms of number of titles accessed only roughly approximate the raw number of uses data. That is, the subjects roughly correspond from the raw number of uses (Table 2), but there is

Table 3
Number of e-Book Titles Accessed, 2000–2004

Subject	# of Titles Accessed, 2000	# of Titles Accessed, 2001	# of Titles Accessed, 2002	# of Titles Accessed, 2003	# of Titles Accessed, 2004	Total # of Accesses
Business, economics, and management	4	11	73	209	406	703
Literature	5	12	70	164	324	575
Social sciences: general	2	15	72	138	314	541
Medicine	1	5	28	59	226	319
Computers	0	2	17	53	217	289
Arts	2	1	8	34	109	154
Education	1	7	16	28	101	153
History: world and general	3	0	10	27	77	117
Law	0	0	6	33	75	114
History: United States	1	4	22	31	46	104
Religion	1	0	9	35	54	99
Philosophy	1	0	13	30	52	96
Home economics	2	3	6	24	53	88
Psychology	0		17	14	57	88
Political science	0	2	6	19	57	84
Sports and recreation	0	0	4	14	43	61
Language and linguistics	0	0	7	20	33	60
Technology, engineering, and manufacturing	0	1	9	15	28	53
General works and reference	0	0	6	15	23	44
Agriculture	2	0	7	11	23	43
Library science and publishing	1	3	6	10	19	39
Biology and life sciences	0	1	4	9	22	36
Other	1	0	2	9	9	21
Mathematics and statistics	0	0	1	3	16	20
Travel and geography	0	0	10	2	8	20
Networking and telecommunications	0	0	1	4	14	19
Physics	0	1	1	2	8	12
Science: general	0	0	2	4	5	11
Earth sciences	0	0	3	3	2	8
Chemistry	0	0	1	1	4	6
Sociology and anthropology	0	0	1	2	1	4
Total items accessed	27	68	438	1022	2426	3981

no one to one correspondence. Thus, computers, which in terms of number of total uses ranks second, ranks fifth when the number of titles used is considered. A possible explanation for this disparity might be that certain core titles in an area may be being used exclusively, resulting in a small number of titles being used repeatedly. This could result from, for instance, a class in computer science that uses an online text found in the netLibrary collection.

As Table 3 shows, over time, each area had an increase in the number of titles accessed, demonstrating a growing acceptance of the electronic collections. It is prudent to note, however, that any estimation of overall relative value would need to account for the constant addition of titles to the SOLINET I, II, III, and IV collections through the years subscribed to the collection; each collection comes out in stages, with additional titles coming online at each addition.[20] In this case, though, the data show an increase in the number of titles accessed, indicating wider use and acceptance over time. While the increase in number of titles accessed is not nearly as great as that for the raw number of accesses, this difference, accounted for by repeated use of individual titles, still reflects an increase in usage. The rate of increase in use for individual titles generally maintains a ratio of at least 2:1, increasing at a rate of twofold each year.

Tables 2 and 3 support the idea that certain subjects lend themselves to electronic use. While this may reflect the subjects which most appeal to users at AUM, it justifies the purchase of additional titles in these subjects. Those subjects with the lowest and the highest use deserve greater study. In the case of the least used subjects, an increase in the number of available titles or an increase in publicity regarding the availability of materials may be in order. In those subjects with the highest use, a reinforcement of the collection, perhaps by purchasing additional electronic copies, seems appropriate.

Table 4 also supports the idea that certain subjects of study lend themselves to online usage. Taking data from studies published earlier, a chart of most used subjects, as defined by netLibrary, for several institutions has been assembled; these data come from various time periods and collections. Interestingly, while there are numerous ways to parse data, each institution has fallen back on raw number of uses.

So, for example, it can be seen that the patterns of use, the subjects most used, are quite similar between the institutions, regardless of size or Carnegie ranking. Generally, the most used subjects, as given in the studies found, are similar; note that the subjects used varied between studies. Thus, computers or computer science is a highly used area no matter which institution is studied. Similar findings can be found for business and economics; medicine, health, and wellness; and literature. Other subjects, such as technology and engineering, education, and library science, vary in the amount of use, sometimes appearing and sometimes not. This can be explained by the difference in curricula and programs offered by the institutions[21]; AUM, for instance, does not have an engineering program, so it is expected that AUM would not have heavy demand for that subject area. However, it still is appropriate to compare the findings of earlier research to the AUM data in an effort to steer development of the electronic collection.

Building on the comparisons between the use of subjects in electronic format at several Carnegie Research Level I institutions and the subjects most used at Auburn University Montgomery, findings from previous studies may be applied to local circumstance. Unfortunately, beyond giving suggestions for future study and considerations of collection development,[22–24] few authors give concrete suggestions regarding interpreting use data for collection development plans. For instance, Dillon[25] speculates that certain subjects "lend themselves to the quick reference-style look-ups common to Internet usage," while other heavily used subjects may be the result of a lack of printed materials. Dillon recognizes that a lack of printed material may need to be factored in to collection development practice, particularly among a system collection. Others find that the electronic collection is too new to factor into collection development decisions[26] while others take an integrated approach, embracing the addition of electronic collections to the overall collection as a part worthy of equal development alongside printed works.[27] Institutions' reaction to the use of electronic books has ranged from skeptical to enthusiastic. While longitudinal data on use of electronic collections are lacking, it is slowly being added to the literature; it is telling that, of all the institutions referenced in this study, none have come out against building the electronic collection.

At Auburn University Montgomery, overall use of electronic books has demonstrably increased in the five years since the first electronic books were added to the collection. While this coincided with the growth of the electronic collection through the addition of new collection sets available from netLibrary through SOLINET, it occurred during a downturn in use of printed materials. These trends indicate a need for strengthening of both the printed and electronic collections. Given the availability of electronic books versus printed materials, an effort must be made to determine the more cost-effective manner of providing these materials. While it is certainly cost-effective to add whole, general collections such as the netLibrary SOLINET I, II, II, and IV collections, adding individual electronic titles may prove more expensive. Additionally, little advice is given in the literature as to determining which titles within subjects would be better suited to printed or electronic collection. It is considered a wise investment at AUM to continue adding electronic collections, while intensifying printed collection development efforts. Additional studies as to cost-effectiveness of electronic titles are necessary to fully realize the potential for collection development.

Conclusion

Comparing the usage data for Auburn University Montgomery, a Carnegie Master's Level I institution, with that of larger research level institutions shows surprising similarity between the subject areas used, whether the collection is a preselected bundle or purchased as individual titles. This similarity lends credence to the idea found in much of the literature that certain subjects lend themselves to the electronic format. Unfortunately, detailed use data, such as time-of-use, are not provided by netLibrary; similarly, purpose of use, or why the patron is using a certain title, can only be provided through the use of surveys, something out of scope of much of the current literature. The ever increasing amount of use demonstrated by the statistical reports available from netLibrary indicates the acceptance of remotely accessible monographs by the AUM Library's patrons. This leads to the conclusion that netLibrary is an expected part of the AUM Library's holdings. By

Table 4
Most Used e-Book Subjects, Based on Raw Numbers of Accesses

NCSU	University of Rochester	UT-Austin	TAMU	CSU System	UNC-Chapel Hill	Duke	LSU	AUM
Computers	Economics and business	Computer science	Economics and business	Economics and business	Social sciences: general	Computers	Library science, publishing	Business, economics, and management
Technology/engineering	Computer science	Business/ economics	Computer science	Computer science	Literature	Psychology	Literature	Computers
Economics/business	Technology and engineering	Medicine	Literature	Technology and engineering	Business, economics, and management	Medicine	Economics and business	Literature
Medicine/health/wellness	Psychology	Sociology	Military science	Sociology	Medicine	Religion	Biology, natural history, and microbiology	Social sciences: general
Literature	Medicine, health, and wellness	American history	American history	Literature	Computers	Arts	Education	Medicine
Philosophy	Literature	Literature	Technology and engineering	Law	Religion	Political Science	Sociology	Law
	Anatomy and physiology		Sociology	Medicine, health, Wellness	Arts	Social sciences: general	Political science	Education
	Sociology		Education	Library science, publishing	History: world and general	History: world and general	Technology and engineering	Arts
	Education		Religion	Anatomy and physiology	Education	Philosophy	Medicine, health, and wellness	History: world and general
			Psychology	Religion	Psychology	Education	Mathematics	Philosophy

showing that certain subjects have experienced much of this increased use, a strengthening of the collection in those areas is warranted. Collection strength would be increased further by integrating the electronic book collection development with that of the printed collection, allowing development in both formats as demanded by use.

While further research in the areas of print versus electronic collection building is merited, that is beyond the scope of the current study. Preliminarily, a cost comparison of netLibrary titles against the cost of the same titles in print is necessary for the purpose of determining the best use of funds. Additionally, a comparison of print and electronic usage by Library of Congress class would yield data more comparable for collection development in print and electronic formats. Studies of user acceptance of the netLibrary model might be undertaken to determine user preference. A final problem might consider actual use of the netLibrary collection, i.e., whether ready reference or for in depth research; user surveys might give a better indication of how the electronic collection is being used, as netLibrary does not provide length of use or other sufficiently descriptive data to be interpreted along these lines. At this point, it is desirable to build the collection in both formats to offset declines in the use of printed works and to provide support for users who prefer electronic access.

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