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The purpose of science branch libraries at the University of North Carolina at Chapel Hill has shifted recently with the rapid emergence of electronic resources such as journal databases and e-books. This shift caused a decline in use of print materials like monographs and serials but has provided new ways for patrons to locate needed information. Recreating the role of a science librarian at the University of North Carolina at Chapel Hill can help the library system provide the best reference and instructional services for mixed media collections. Although the science branch libraries have consolidated, their physical collections are still significant to the academic community and will continue to be so into the foreseeable future.

Headings:

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THE EVOLUTION OF SCIENCE BRANCH LIBRARIES AND PRINT USE AT THE
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL FROM 2000 TO 2010

by
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Introduction

Branch libraries are slowly fading away to make room for consolidated libraries with a shift in focus to accommodate the increasing amount of electronic resources. Print circulation is studied by looking at circulation from the University of North Carolina at Chapel Hill (UNC) between 2000 and 2010. Science branch libraries are examined specifically since they recently consolidated into two main locations, Kenan Science Library and the Science Library Annex, in July of 2011. The science branch libraries examined at UNC include Botany, Zoology, Chemistry, Geological Sciences, Biology/Chemistry and Math/Physics. Print usage has been on the decline as UNC has shifted its collection focus to encompass electronic databases. There is still a significant amount of print use despite the decline although the branch libraries are being reformatted to include new media such as electronic resources. Libraries have been gradually reshaping their services in order to provide the appropriate materials to suit their patrons' needs. Although science branch libraries may slowly be morphing or consolidating into centralized locations, the print collections they contain are still significant in this digital age.

Literature Review

Large universities have typically had branch libraries, or libraries that support specific departments and research communities, as well as centralized libraries for faculty and student use. Certain characteristics are favored by departmental libraries such as the availability of a subject librarian, closeness to research laboratories, special facilities access, and customized service for the users, among others (Twiss-Brooks, 2005). Through these characteristics, library systems can decide whether to maintain a branch library or consolidate it with other branches by analyzing factors like the size of the primary user population, allotted budget, circulation and services, space usage, and accessibility (Hiller, 2004). When looking at the characteristics of centralized libraries, they tend to include comprehensive and unified collections, greater access to technology, more space for the collection, and the increased ability for interdisciplinary research. The differences between the branch libraries and centralized libraries vie for importance depending on the economic health of the university as well as access and availability of materials and users (Twiss-Brooks, 2005). Whether or not an academic institution favors branch or centralized locations largely depends on the users and the available budget.

Space for a print collection has always been an issue in branch libraries, as has the issue of weeding materials to make room for new ones. With the growth in the amount of research and publications seen over past decades, the need for space has been cause for concern within branch libraries due to possible damage and security of the collections

(Twiss-Brooks, 2005). Twiss-Brooks (2005) looks at the construction of new libraries and how they can help alleviate the space problem by allowing branch libraries to refocus the scope of their collection. In the case of the University of Chicago, the construction of a new science library enabled the Chemistry Library to send some of their lesser-used materials to the new space, which freed up room for newer research materials. Chemists have always been strong supporters of the branch library system because of the convenience to the researchers, faculty, and students at that location. This was not convenient for everyone, however, due to its non-centralized location and its limited hours of operation. Twiss-Brooks (2005) notes there is always a bit of a struggle to make everyone happy and it is the job of a librarian to put the considerations of all its users first in any equation.

Along with the changing role of users, librarians must also redefine their place in the library. The promotion of user self-sufficiency has meant a decrease in visits to the physical library by the user community, which has caused the viability of branch libraries to be questioned. With this in mind, declining budgets and space concerns were discussed as additional people were using more electronic resources and less print resources (Hiller, 2004). Twiss-Brooks (2005) analyzed the new digital innovations brought about by database systems for journal articles, which made libraries start taking a second look at the necessity of branch libraries. The extreme popularity of online journals led to the decreased use of the print collections, both the circulation of them and in-house use. As the increased use of online journals reduces the need of a core print journal collection in branch libraries, librarians must determine how to tailor library services to best support the needs of the users (Davis and Weber, 2002).

Collaboration with the primary user community is necessary to develop and implement services that cater to their information needs whether it is in a branch library or not. Many different factors go into deciding whether or not to open a branch library or maintain it including the size of the primary user population, budget, hours of operation, accessibility, circulation and services, space usage, and distance from the main library facility. However, the most heavily counted factor relating to the closing of branch libraries is the budget or funding-related factors (Hiller, 2004). The increased use of electronic resources and their rising costs along with remote-access use is continually counted against the declining frequency of physical library visits. The use of the library facility is an important factor in determining the viability of a branch library. If use is low, the need for a stand-alone branch library is low (Hiller, 2004).

One way to examine library use is to look at the primary user population. Branch libraries tend to support the faculty and students within the departments directly supported by the library, which means enrollment numbers and faculty size are key variables. Other variables may include frequency of library visits for collection use and the importance of books and journals to faculty and graduate student research. These variables depend on how different user groups utilize the library. For example, faculty tends to visit the library in order to use the collection as do most graduate students. Undergraduates, however, mostly use the library space and services, not necessarily the physical collection (Hiller, 2004).

In recent years, branch libraries have become a focus for many university library systems. Branch libraries are moving to centralized locations or shifting focus to more of a reference and instructional services model. These library changes typically involve a

need to listen and deal honestly with the department associated with the situation. Human factors are very important when consolidating branch libraries, especially when library and faculty feuding or falling-outs can occur (Calderhead, 1997). These problems may arise due to the faculty not being consulted to the extent they felt they should or based on the change not addressing the needs of a particular research group. As Calderhead (1997) points out, the pursuit of efficiency by libraries may cause unnecessary stress with their primary users groups. The shift from a user-based focus of a branch library to an administrative efficiency focus of a consolidated library system is a big adjustment for many department faculty to make. On the other hand, the interdisciplinary nature found in centralized libraries has made it easier to use materials from other fields to support research. Control of the journal collection improves because there is more room and it allows patrons to browse a diverse array of material. One of the jobs of a librarian is to make sure patrons have equal access to materials, which is more difficult with branch libraries due to their specific user-based mission (Calderhead, 1997).

Hiller (2004) measures the viability of the physical library through certain principles of consolidating libraries. The location where the collection resides should be catered towards the user community and provide complete access for the entire campus community to a unique collection. The amount of space for the collection should be an improvement over the branch library location but should reduce the erosion of service quality that takes place when a small amount of staff is spread over many different libraries. The consolidation should not be too much of an inconvenience to the users of the branch being relocated and should also be compatible with the long-term strategic goals of the library and the university (Hiller, 2004). Throughout the consolidation and

after implementation, the library staff will need to analyze how and what materials are being used in order to best provide resources for the users. Previously, resources were selected by user request in branch libraries but with the centralizing of collections, the whole of the user community must be considered above the individual (Calderhead, 1997).

An interesting model has developed regarding the library presence within academic departments instead of removing the branch library completely. At the University of Southern California, the subject librarian and technological resources were moved to the departments where the faculty and students are located while the print materials stayed at the centralized location. The subject librarians provided reference and instructional services without the cost and space issues brought about by an actual branch library (Davis and Weber, 2002). Staffing the various branch libraries was becoming an issue and with this outcome, the university library was still able to provide services needed by the department. “Though closing a branch library is never a popular decision, the outcome in these cases is a positive and proactive service model” (Davis and Weber, 2002, p. 52). While the department may grieve for the loss of an integral part of their community, the resulting strategy provided departments with a librarian suited for reference and instructional services in a digital age.

With the advent of electronic resources, the role of librarians has shifted gears to a more teaching based approach. The increased visibility of subject librarians within schools has allowed them to become more involved in school events and committees while creating close relationships with faculty and students. These users find it easier to access the librarians to ask reference questions as well as learn research skills in a high

tech world (Davis and Weber, 2002). These services are extremely important for graduate and doctoral level courses, which teach students how to use print and electronic resources responsibly for research purposes. Print materials, however, do not get the same amount of attention as they have in the past. Digital resources have become mainstream, which librarians can find challenging because library work used to revolve solely around the print materials at hand (Davis and Weber, 2002). The changing of scholarly publishing into the digital world has instigated an open and honest communication between the library staff and the library users. Librarians need to know what users want from the available resources, both print and electronic (Twiss-Brooks, 2005).

Collection development in a time of decreasing budgets is a high priority for both electronic resources as well as print resources. Judgment calls need to be made on what should be purchased now over what should be purchased when the money is available. With the closing and consolidation of many branch libraries, the decrease in space means a lot of print materials will be moved to storage, meaning less of the collection can be browsed. On the other hand, print materials are not duplicated because only one copy of an item is typically needed (Davis and Weber, 2002). Librarians must now focus on how patrons are using the print and electronic collections, and how these collections must be tailored to be more financially efficient and provide the users with access to what they require.

Currently, there are many conversations going on about whether or not print resources should be cancelled in order to make way for their electronic counterparts. At the same time, there is some caution against canceling print subscriptions because of the uncertainty of online collections. This makes it extremely difficult for libraries because

they often subscribe to both a print and an electronic version of an item, which costs more than they can currently afford (Tenopir, 1999). Finding a solution to this challenging problem depends on the library and what community it serves. There needs to be a balance between what to purchase in print, purely digital, or as a mix of both. Electronic versions of the same journal can often look different from what you might get in print based on the format, purpose, and source (Tenopir, 1999). As Chrzastowski (2003) noted in their research, some patrons express an interest in having the majority of journals through electronic access, particularly in the field of chemistry. Since in-library use has gone down in past years, electronic access surely contributes to this (Chrzastowski, 2003).

Electronic journal use is easier to track than print usage due to it reflecting the amount of downloads. Print use is not as easy to track because high-use titles may be located in several different libraries on an academic campus (Chrzastowski, 2003), especially with science journals since there is a lot of cross-discipline usage. Faculty may often have their own personal copies of some journals but may have migrated over to digital once it became more readily available. This is one way that supports the decrease in print collection use as electronic use increases (Chrzastowski, 2003). Chrzastowski (2003) also notes that libraries have to look at cost per use ratios to see if money is being spent effectively. It is hard to keep track of total cost of electronic resources since departments can purchase them, a certain library on campus or by the campus library system itself. The increase in use can also cover the increasing inflation of electronic resources (Chrzastowski, 2003).

In the case of Drexel University, the cost of a print collection versus an electronic

resource collection was studied as they made the move to drastically reduce the amount of print journals and go mostly electronic. Montgomery (2003) looked at the change in staffing, differences in cataloging and updating databases and found that going mostly electronic is more cost effective since there are higher costs involved in binding and storing print journals. They did note, however, that it is good to keep print equivalents of core journals. The next part of the process is the archival question as to how the online information will be stored and maintained, and how much that may cost libraries in the future (Montgomery, 2003). "Use of current print issues exceeded bound volume use in the biological, life and physical sciences and in engineering following the pattern used at Drexel. However, bound volume use was heavier in the arts, humanities, and social sciences" (Montgomery 2003, p. 183). Therefore, print use is still found in the sciences since scientific researchers require their information to be as up to date as possible.

Drexel University conducted a study of the costs associated with migrating from print to electronic. Montgomery and King (2002) looked at space, systems, supplies and services, and staff by function in order to find an approximate total operational cost for both print and electronic resources. They found that bound print volumes were more costly than using electronic databases. They noticed it was particularly hard to look at print per use costs since it is hard to tell if a user looks at more than one article in a bound volume (Montgomery and King, 2002). Electronic use data can often be flawed as well since each publisher counts a use differently (Montgomery and King, 2002). Another factor in the Drexel University study was the rising cost of purchasing print journals at the same time libraries are trying to purchase and expand their electronic resources. This creates high costs because more and more people are using electronic access as fewer

patrons are using the print collection. This means print journal subscriptions are slowly being cancelled (Vaughan, 2003). The high costs of maintaining both print and electronic resources in branch libraries have taken the front seat over facility quality of branch libraries. Many branch libraries are several decades old and in need of improvement. Many universities have made the decision to be more cost effective in taking the branch libraries out of the picture in order to concentrate on the research collections for their faculty and students (Hiller, 2004).

Since electronic journals have become so popular, print journal use is not worth the cost they accrue, except for high-use journals. There is pressure to use electronic resources due to the cost involved for online access but has since become easy to use for most faculty and students (Vaughan, 2003). A downside to this is patrons may only look online for resources and not realize that everything is not yet available through those electronic databases. There is still important information to be found in print resources but those resources are being overlooked more frequently (Vaughan, 2003). There are still several advantages of having print resources available for patrons. Some patrons may not have a good working knowledge of how to use databases because they may lack access to either a computer or the Internet, or dislike not having a hard copy available to them (Rogers, 2001). Some patrons may use online access to journals but still print out a hard copy for their use since online use inhibits annotations and highlighting relevant passages.

The growth of e-readers and e-books has been astronomical over recent years but has not seen much attention in the academic world. This may be the result of leisure books currently being the primary market for users. Typically, students reading

techniques involve highlighting and annotation, which is more difficult on a digital reading device. Searching the text is complicated for students as well since it often takes longer to skim an e-book than a print monograph. Students found these features cumbersome to use on a regular basis because e-readers are not generally good for mark-ups of the text. Images and figures within the texts are often hard to decipher or match to the proper text, which is of great importance in the sciences (Thayer et al, 2011). The graphics are often times not the quality they would be in print format (Rogers, 2001). With the e-readers requiring so much attention to the discrepancies and challenges, students do not spend as much time analyzing the actual content of the text. This causes productivity to plummet and academic goals to remain unmet. Some students even take notes on paper while using their e-reader to read the required text. This shows that digital resources cannot completely do without a print supplement of some kind (Thayer et al, 2011). With the constant evolution of e-readers, the needs of students for their academic reading may be met in the near future but e-readers are not able to meet the desired functions at this point in time.

Additionally, there are many restrictions and limitations placed on e-books by publishers as to how users can access and manipulate them. With these limiting factors revolving around Digital Rights Management, users are often frustrated by the hoops they must jump through in order to download and manipulate an e-book (Slater, 2010). Slater (2010) also notes users dislike of reading significant lengths of text from a computer screen, which they would rather read from a printed book. Although e-books may be easier to access initially, users have found print books easier to utilize for longer amounts of time. Other limitations to e-book usage are page limits for viewing, limits to the

amount of text that can be downloaded or copied, and restricting the amount of people who can view an e-book simultaneously (Slater, 2010).

Publishers and vendors have definite privacy concerns with the need to secure profits so they can stay in business as well as guard intellectual property rights. The way publishers approach e-books is different than how they approach electronic journals such as viewing times and print quotas, which have limited patron use of e-books. Patrons expect to use e-books like they use print books but the restrictions placed on access have made that nearly impossible. Libraries and publishers have been applying the print circulation model to e-books but it has not worked successfully thus far, indicating the e-book industry has to reinvent the standards currently in place for e-book use (Slater, 2010).

In academic institutions, e-books are often purchased through subscription packages rather than on an individual basis. This type of access model will surely change as more providers enter the market with the hopeful result of better sustainability for libraries (Slater, 2010). Even though e-books do not have the typical maintenance costs seen with print materials, libraries need to remain aware of storage, operational, and perpetual access costs. With only a small percentage of the book market devoted to e-books, these concerns have not been at the forefront of the publishing industry (Slater, 2010). This creates the problem of poor access to academic e-books, which makes it difficult for academic libraries to provide the resources their patrons' desire.

Rogers (2001) made some noteworthy points relating to disadvantages to going mostly electronic. There is the question of what to do if the network is down either on the side of the library or the side of the publisher. There could be no access for a while,

which could hinder both students and faculty from accessing much needed data. Patrons may also have trouble distinguishing between quality resources and non-quality material found through free online databases (Rogers, 2001). Faculty and students have still been able to broaden the range of journals read since they can do wider searches of topics and save time. However, libraries will still need to depend on publishers to archive the databases permanently for their use in the future (Montgomery and King, 2002).

Methodology

Operational Definitions

Use of science library print collections – circulation data as well as total use data collected through the circulation programs Millennium and DRA

Public universities – data will be used from science libraries at the University of North Carolina at Chapel Hill

Library – samples taken from available circulation data between the years 2000-2010 from the Math/Physics Library, Geological Sciences Library, Biology/Chemistry Library, Botany Library, Chemistry Library, and Zoology Library

Significance – when compared to past circulation records, the current use of science library collections is still enough to warrant staff time and effort at the new Science Library Annex location by looking at the relationship between print and electronic use

Electronic resources – databases that UNC subscribes to, which provide access to electronic versions of articles and/or books for patrons to use

Branch library - definition of a branch library “a library service unit under the management of the library administration, with collections and staff, which is physically separate or divided from other library service units” (ACRL, 1991)

Selection of Resources

A review of the literature was conducted to examine past research of branch

libraries and use of materials. A lot of research has been conducted on print and electronic journal use, particularly in chemistry libraries, but not as a comparison to other science libraries such as the geological sciences or math and physics.

Data from checkout statistics of print resources were compiled for the University of North Carolina - Chapel Hill branch science libraries. These data are meant to show how print use has changed over past years but also show there are still plenty of patrons using the print collection at the science libraries. It is worthwhile to learn who tends to use the library collections the most. Statistics on this will be able to shed some light on the subject.

Data was collected from the years 2000-2010. The statistics are from the Botany Library, Zoology Library, Biology/Chemistry Library, Chemistry Library, Geological Sciences Library, and Math/Physics Library. The Science Library Annex was formed in July 2011 so information on this library is not included in the current research. The Science Library Annex combined all the science branch libraries into one location with many of the current Chemistry monographs and serials in the Kenan Science Library. The data collected was taken from Annual Reports on behalf of the branch librarian, or from Excel files containing circulation statistics for each branch library involved in this research.

Limitations

Limitations with this study are linked to the type of accessible data and the amount of data needed to support the hypothesis. Due to the statistics being in multiple science libraries, the data collected may be different based on how it was collected and

when. The use statistics of each branch library generally reflect particular types of usage such as print monograph checkouts, in-house use, and serials use but in some cases are not specifically stated as such. Under these circumstances, checkout statistics include all print resources such as monographs, theses, serials, reserves, renewals, and in-house use.

Analysis

With the increased accessibility of digital resources, print resources have seen less use by faculty and students. At the University of North Carolina at Chapel Hill, this is visible when analyzing use statistics from the science branch libraries on campus. Over the decade of 2000 to 2010, the Botany, Zoology, Math/Physics, and Geological Sciences Libraries show a general downward trend in print circulation. With the tough budget times in North Carolina, the university library system most likely decided that consolidating would be more efficient as well as user friendly. A Science Library Task Force was conducted to determine what the right move would be for UNC and its users.

The science libraries began consolidating in 2005 when the Zoology section of the Biology Library moved to Wilson Annex. The Chemistry Library merged with Zoology a year later while its permanent location, Venable Hall, was rebuilt. In 2008, the Botany section of the Biology Library joined Zoology and Chemistry in Wilson Annex. Once the new Venable Hall was built, the Chemistry Library was moved and renamed the Kenan Science Library. The Geological Sciences Library closed in July 2011, as did the Math/Physics Library. They both joined Biology/Chemistry to become the Science Library Annex, which was previously named Wilson Annex. Most chemistry monographs and unbound serials are kept at the Kenan Science Library in Venable Hall, which is where the Chemistry Department is located. Once the serials are bound, however, they are moved to the Science Library Annex collection. The science librarians

are also located at the Kenan Science Library while the Science Library Annex has University Library Technicians to handle the collection. Student assistants are present at each library to help with book circulation and shelving. Graduate assistants help the staff with projects relating to things like serials management, Libguides, instructional and reference services, and other projects relating to both the print and electronic science collections.

For this study, circulation statistics were used that were collected through Data Research Associates (DRA) software from 2000-2005 and through Millennium (Innovative Interfaces Inc.) integrated library software from 2005-2010. The software used did not change the type of circulation statistics collected by each branch library. The data being analyzed for the circulation statistics are checkouts of print monographs, theses, renewals, reserves, serials, and in-house use. Circulation statistics are complete as each library perceived them to be. Each branch librarian recorded their statistics differently so the assumption is made that general circulation includes print monographs, print theses, and renewals. Some of the libraries have these separated out into their own categories but for the purposes of this analysis, all circulation statistics have been totaled together unless otherwise specified.

The Geological Sciences Library has generally seen a downward trend during this decade as more journals are available online. Circulation decreased by more than half between the years 2000 and 2010. From this, we can infer that the increased accessibility

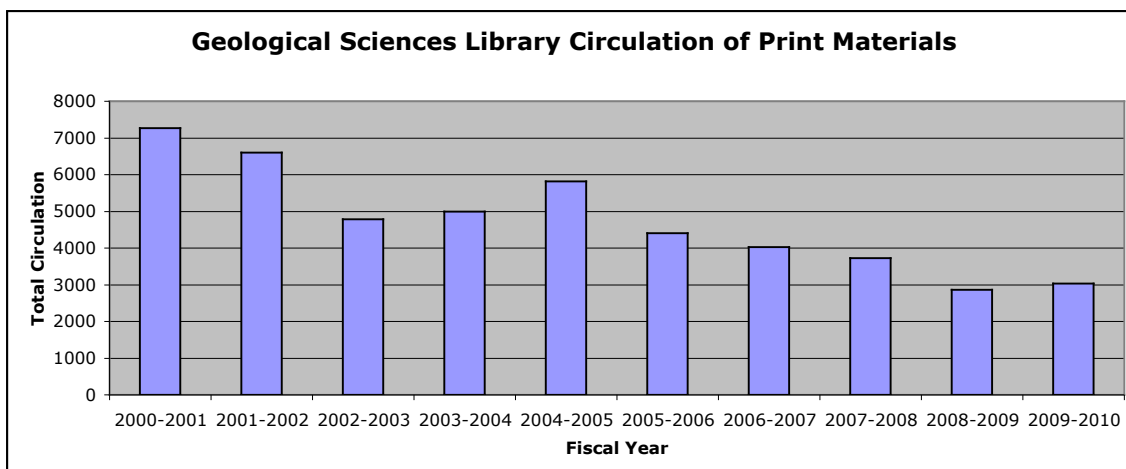


Figure 1. This figure shows a decline in the circulation of print materials in the Geological Sciences Library from 2000-2010.

of electronic resources is to blame for the decline. Through UNC University Libraries, faculty and students in the geological sciences have access at least nineteen databases that contain electronic resources related to geology. This does not include other science fields that are often used by geologists for their interdisciplinary research. With the electronic resources containing more interdisciplinary materials may have found it easier to use those versus print materials for certain types of research. Print use has not completely gone away, however, and is still providing valuable information for faculty and students that they cannot find elsewhere at this time.

The Math/Physics Library has seen an upward trend in circulation. There was no jump along these lines in the other science branch libraries, which may be due to the Math Departments' dependency on the library and its collection. The Math Department faculty and students were the most vocal when asked their opinion about the consolidation of the science branch libraries according to the Science Libraries Task Force (2011). These faculty and students would have preferred the Math/Physics Library to stay where it was due to its excellent math collection as well as its accessibility.

Faculty and students were able to visit the library at their convenience during the day in

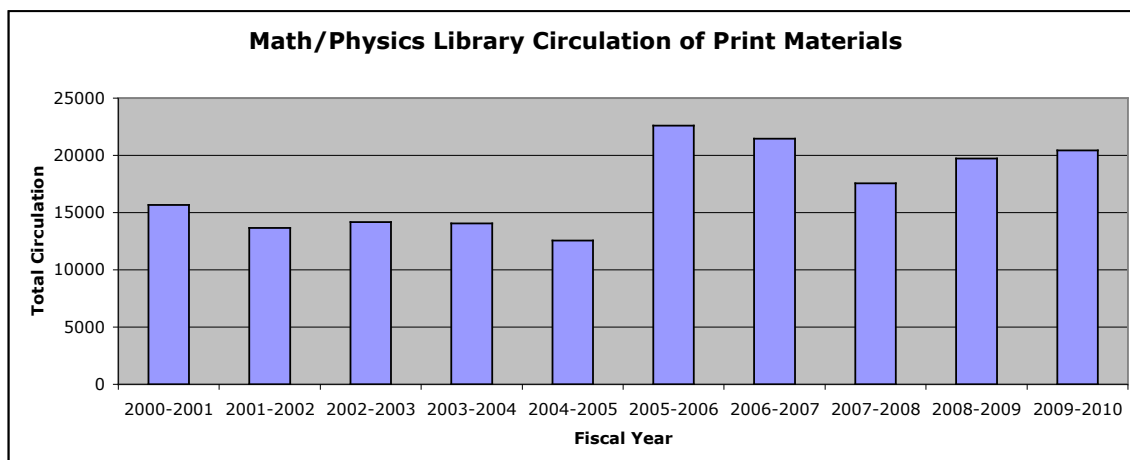


Figure 2. The Math/Physics Library demonstrates a marked increase in print circulation in 2005, indicating strong usage by the Math and Physics Departments.

order to look at new print materials such as books and current journals. The use of the Math/Physics print collection has stayed fairly consistent from 2000 to 2010 and has even seen an upward trend in print use.

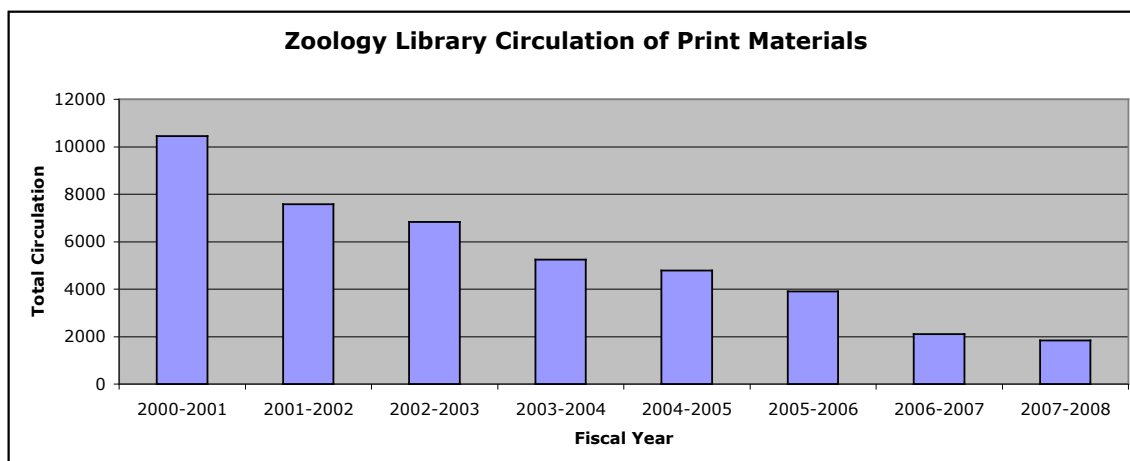


Figure 3. The Zoology Library includes the circulation of print materials such as books, theses, serials, reserves, and renewals as well as in-house use, and shows a steady decrease in circulation.

A definite downward trend is visible for the Botany and Zoology Libraries. Print use in the Zoology Library has decreased by approximately 80% whereas the Botany Library did not see such a dramatic decline but still saw a definite cut in print material circulation. Biologists seem to use less print materials because their research hinges on

new discoveries versus using previous research or data to formulate a new opinion. They also do a lot of fieldwork and do not spend as much time in the laboratory as many of their colleagues in the other sciences do. Another reason biologists may use less print materials is the selection of biology journals online covers enough of the discipline so that visiting the library for materials is a rare occasion. At UNC, the decision to combine

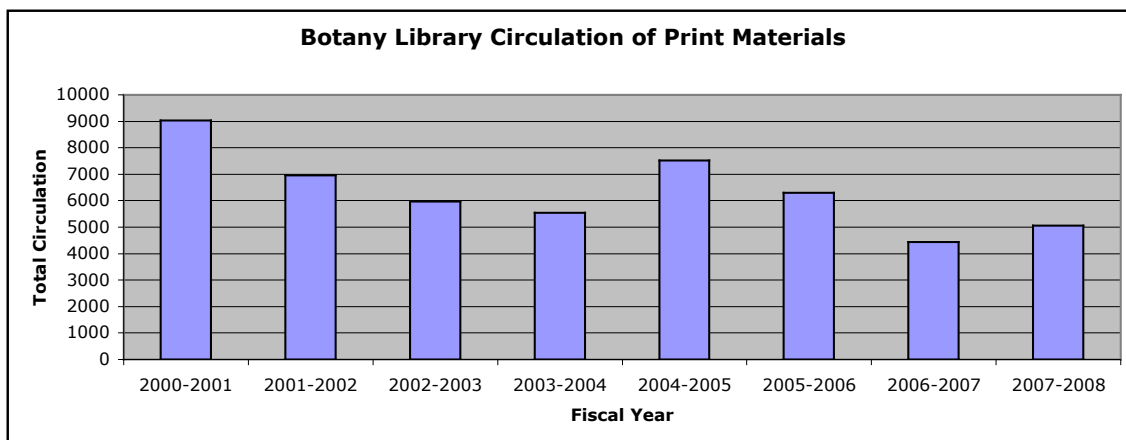


Figure 4. The Botany Library includes the circulation of print materials such as books, theses, serials, reserves, and renewals as well as in-house use, and shows a gradual decline in circulation statistics.

the Botany and Zoology Libraries was beneficial for everyone involved. Researchers could use the new Biology collection at Wilson Annex or use the Health Sciences Library based on their information need. Creating the Biology Library helped the university by requiring less staff to take care of the collection, which means less money given to collections that do not see a significant use by researchers.

Chemistry Library circulation has declined more than several of the other science branch libraries. The decline could be related to several factors including greater access to online publications as well as the move to Wilson Annex in 2006. The Chemistry

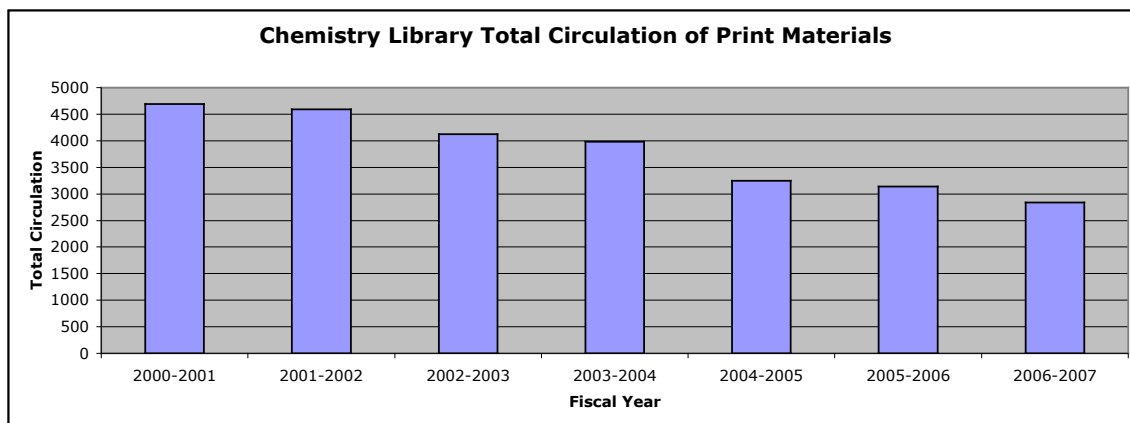


Figure 5. This figure shows the decline in use of print materials for the Chemistry Library, which moved to the Wilson Annex in 2006.

Library has moved multiple times over the past decade due to the new Venable Hall being built so the consolidation of libraries may not have affected the faculty and students as much as it may have the other branch libraries. As strong supporters of branch libraries, chemists would be very disheartened to see the Chemistry Library move completely from their department. The Kenan Science Library is still located there, however, and provides access to chemistry reference sources, current journals, and provides study space for students.

With only a few years to evaluate, deciphering a definite trend for the Biology/Chemistry Library is difficult although there are indicators of an increase in use since the merge in Wilson Annex. There may be a downward trend in print use for some of the libraries but the circulation statistics still show a significant amount of use by faculty, students, and staff. With the addition of all the science branch libraries to one location, circulation will hopefully keep increasing and stabilize in the near future.

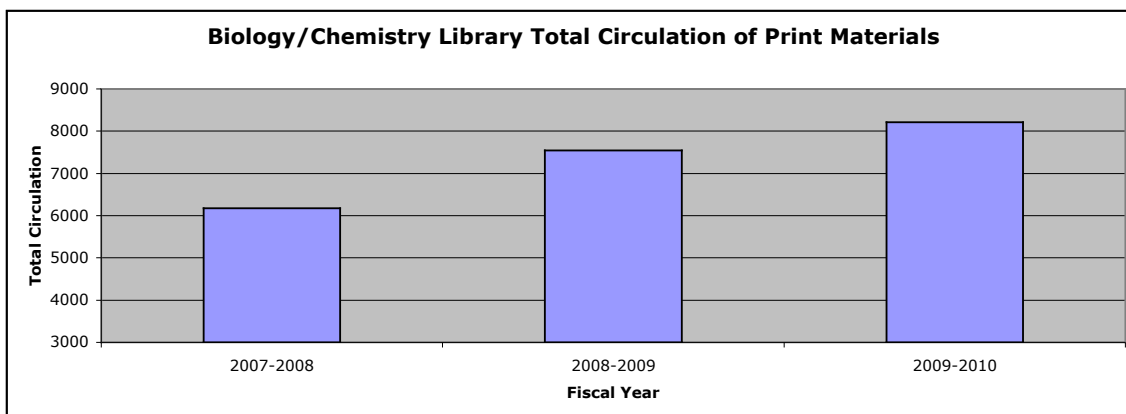


Figure 6. The Biology/Chemistry Library, created in 2007, includes the circulation of print materials, which indicates an increase in print use.

Botany and Zoology Libraries counted together beginning in 2008 when the Botany section moved to Wilson Annex to join the Zoology section and Chemistry Library. Statistics for this library are only available starting in 2007-2008, since they have recently joined together. Biology/Chemistry was still counted as one unit, even when a bulk of the collection went back to Kenan Science Library in the new Venable Hall. There has still been upheaval in the science libraries with the Chemistry Library relocating to Venable Hall. With the addition of the Geological Sciences and Math/Physics Libraries in 2011, all the branch libraries have not yet calculated circulation statistics before the big move so it is not yet possible to tell if the relocation of these libraries has made an impact. Several years down the road, it would be interesting to analyze how the move affected the circulation of the science collections. The move has offered the science collection a more centralized location as well as offering a more interdisciplinary selection once all the science collections were merged in call number order.

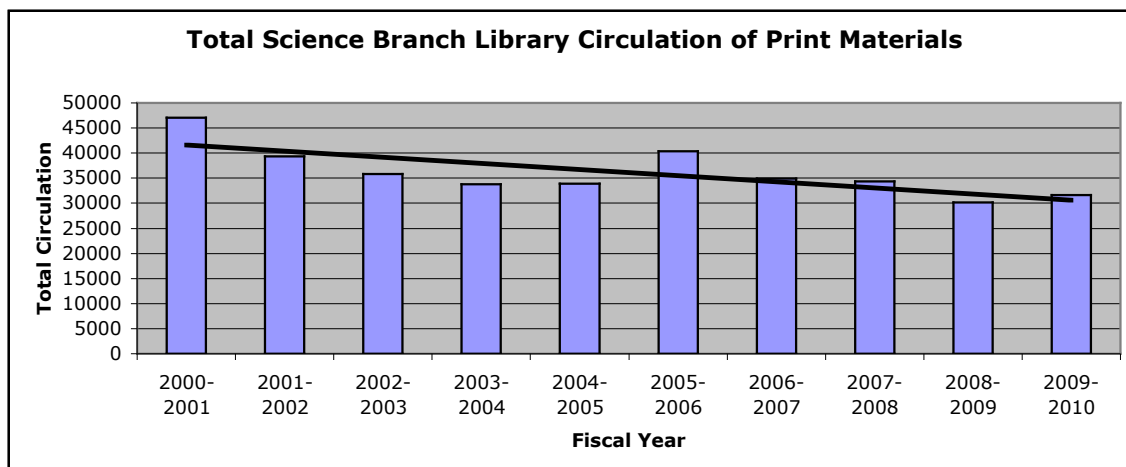


Figure 7. This figure shows the total circulation of print materials from all science branch libraries at UNC-Chapel Hill combined from 2000-2010.

With the current economic conditions, many state budgets have been cut, which means less money going into the education system. The budget for higher education in North Carolina has been cut significantly. Universities, in particular the University of North Carolina at Chapel Hill, have to start making more with less even as students have to deal with an increase in tuition to cover the imbalance. When looking at the total circulation of print materials for the science branch libraries, the linear trend line shows a steady decrease in print use. Therefore, UNC University Libraries made the decision to consolidate the print collections to benefit the university as well as the faculty and students. Reference and instructional services are still provided, as are the excellent collections UNC is known for. Resources have not been removed, just relocated.

According to the Science Libraries Task Force Report (2011), faculty and students rank print resources as their second most important service after electronic resources. While e-resources may have taken over as the most important service, having print resources still emerge above staff assistance, space and facilities, and access to library computers indicates a strong need for print resources. Within a research

university, the opinion of the graduate students and faculty is extremely important because they typically make up a large percentage of those who use the resources within the science branch libraries.

Through these data on the science branch libraries at UNC-Chapel Hill, other large research universities can make the decision whether or not to consolidate their own science libraries. Some universities may not find this necessary if their researchers are using the collections in a way that would be negatively impacted if branch libraries were to consolidate. Other universities may have already initiated this consolidation or would desire more knowledge on the topic before seriously considering the process. There are certain ways to consolidate science branch libraries without completely removing the library's presence.

One way to provide excellent service would be to have embedded librarians at each of the science departments, either for certain hours during the week or have the librarian work from an office located within the department. Which of these would work best would depend largely on the department and the community the librarian would serve. When the Science Libraries Task Force did their research into the scientific community on the UNC campus, the Mathematics Department and the Geological Sciences Department indicated a strong interest in library presence in their buildings (2011). With the print collection having moved to the Science Library Annex, the library will need to maintain a strong connection to the faculty and students of these departments in order to meet their expectations moving forward. An embedded librarian can make sure print collection development will go hand in hand with the ongoing research of the department.

The subject librarians will have to bring a myriad of reference and instructional skills to the departments in order to make up for the consolidated collections. These services should highlight the librarians' talents with both print and electronic references as well as aiding faculty and students in finding the right resources for their research. Many journals are now available online through UNC Libraries, which faculty and students may not be aware of. If a journal is not available through UNC, the subject librarian should strongly consider purchasing electronic access, if possible. With the current print journals being relocated, the increased electronic access to journals may lessen the separation anxiety for faculty and students.

With the branch libraries being consolidated, the importance of exceptional reference service has increased. Faculty and students will not be able to make as many trips to the library as they used to so it is important for them to be able to locate the necessary materials in one trip. Instead of browsing at their leisure, patrons often show up at the Science Library Annex looking for specific books. These patrons know exactly what they are looking for so they can check out the books and return to their research or studies. With this in mind, librarians will need to help patrons tailor their searching abilities in order for them to make the best use of their time.

With the quick advances in digital technology and electronic resources, faculty may need the expertise of librarians to help them familiarize themselves with what is available through UNC and how to obtain it. Faculty play a significant role in a research university community for without them, the standing of the university as well as the education of its students would be adversely affected. They also need access to a strong research library in their field in order to continue conducting their research. If their

resources are taken away from them or if they feel they are not getting access to the resources they need, they might decide to go elsewhere to obtain what they need.

Graduate students have many of the same needs as faculty. These science students need the appropriate resources for their research in order to ensure the success of both their educational and their future careers. The print collections in the sciences would not be as necessary if there were more e-books available than there currently are.

For the most part, everyone uses journal databases but not as many print journals as they used to. Online journal resources have become easier to attain than textbooks in electronic format due to publishers not releasing electronic versions for many of their materials as of yet. The software available for e-books has not advanced to a level in which patrons can substitute paper use. The software is not as user friendly as it could be but several companies are working on making e-books simpler to use for academic purposes. There are e-books available for the sciences but are there enough for students and faculty to depend on for their research needs? Some e-books offered allow full-text access through UNC libraries but with no way to annotate or highlight. Researchers will still need a supplement for note taking, whether it is on paper or a computer document.

Current print journals are still read by many patrons of the science libraries since it can often take up to twelve months for the electronic versions to be available online. This can become an issue when a print journal has been cancelled due to the budget when the electronic version has a twelve-month delay. Research can be seriously hindered by such a delay, especially in an area like physics where researchers need the most up to date information possible. Other areas may not feel the lack of current journals quite so keenly but may still like to keep abreast of the research their peers are conducting.

One way to help and encourage use of current print journals is by putting all the resources in one location, not multiple sites. The outcome is more cohesive and easier for patrons to access what they need. If they cannot find something as an e-resource in one location, they have to go elsewhere for what they need, which can be inconvenient and inefficient. Also, science librarians may find it harder to supply quality reference service for print materials because they will have to direct the patron from Kenan Science Library to the Science Library Annex, which has no librarian on location. Eventually, UNC University Libraries will see a need to combine these two libraries in order for all the services to be offered in one place. This will be less confusing for patrons who are trying to browse the print collection for necessary materials at the same time as they use computers to search for complimentary electronic materials.

Conclusion

The consolidation of branch libraries may not necessarily be a bad thing in the case of the University of North Carolina at Chapel Hill. The greater allowance for interdisciplinary research and access to more materials is more efficient for the library and for the researcher. Statistics show that fewer people are using the science branch libraries at UNC but there may be an upward trend now that the libraries are consolidated in two central locations. With an eye on the future, UNC can implement the embedded librarian approach and combine the two science library locations into one possibly new building once budgets become stable again. Large research universities have to think about user and library needs first, even with the economy in a precarious position. With increased access to electronic resources, providing top-notch reference and instructional services has to come first.

Further Research

Are branch libraries going through another cycle or is this the beginning of an era of centralized library services? Future research could consist of an analysis of centralized science libraries and how use increased or decreased since it consolidated from branch libraries. Another interesting research opportunity for UNC Libraries is to look at how the Science Library Annex and Kenan Science Library play a role in the UNC community. Since the consolidation happened less than a year before this paper was written, there may be interest in the differences in usage and efficiency when compared to the branch libraries before the consolidation. Was there more use seen of the science collection once it was consolidated? Or did use decline once it was farther away from the departments that used the branch libraries most often? Who uses the collection more now? Is it more interdisciplinary or is it still mostly the same departments who had the branch libraries in their building?

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