AC 2012-5576: MEETING THE TEXTBOOK NEEDS OF ENGINEERING STUDENTS

Ms. Theresa M. Calcagno, George Mason University

Theresa Calcagno is the Liaison Librarian to the Volgenau School of Engineering at George Mason University in Fairfax, Va. Prior to that, Calcagno was a Research Librarian for an engineering project consulting firm.

Mrs. Jessica Bowdoin, George Mason University

Jessica Bowdoin is currently the Head of Interlibrary Loan and Document Delivery at George Mason University. She has served in this role since June 2008. She was previously the Distance Education Librarian and Head of Interlibrary Loan at East Carolina University, and a Reference Librarian at the College of William and Mary. She obtained her M.S.L.I.S. from the University of Illinois, Urbana-Champaign.

Meeting the Textbook Needs of Engineering Students

Abstract

In early 2009, the Head of Interlibrary Loan (ILL) at George Mason University analyzed ILL borrowing statistics from the previous academic year and found that 90% of the fifty most borrowed titles had been requested by students enrolled in the Volgenau School of Engineering. Further research revealed that:

- 100% of the titles requested by engineering students were identified as IT/Engineering textbooks according to the Departmental Textbook lists kept by the University Bookstore;
- the Mason Libraries already owned 76% of these titles; and
- 83% of the courses using these textbooks were either in the Computer Science or Electrical and Computer Engineering departments.

As a result of this analysis, the Engineering Textbook Reserves Program was conceived by the IT/Engineering Liaison Librarian and Access Services staff, including Reserves and ILL. The primary goals of this program, which was implemented during Fall Semester 2009, are:

- to help alleviate engineering student demand for textbooks borrowed through ILL by placing these titles on reserve; and
- to increase access to high demand engineering textbooks by more effectively utilizing existing library resources and services.

Over the subsequent four semesters, seventy-one different titles have been placed on reserve for seventy different courses (86% of which were at graduate level). These books have been checked out over 1,500 times. Through careful monitoring, sixteen titles that were never borrowed were identified and removed from Reserve status.

The program's goal of increasing access to high demand engineering textbooks was met and since Fall 2009, Mason Libraries realized a savings of approximately $16,800 in ILL borrowing costs for engineering textbooks. The purchase costs for new or updated editions of textbooks have been minimal. The total spent, $3,130.68, is approximately 3.0% of the total discretionary funds allocated for Computer Science and Electrical and Computer Engineering purchases for FY2010 and FY2011.

Introduction

In Summer 2009, the Head of Interlibrary Loan (ILL) at George Mason University (Mason) analyzed ILL borrowing statistics from the previous year and found that 90% of the fifty most requested titles had been requested by students in the Volgenau School of Engineering.

The Volgenau School of Engineering at Mason comprises seven departments: Applied Information Technology, Bioengineering, Civil, Environmental and Infrastructure Engineering, Computer Science, Electrical and Computer Engineering, Statistics, Systems Engineering and

Operations Research. During Fall 2010, the School had a headcount enrollment of 4,287 students;[1] 42% are enrolled at the graduate level.

This paper describes the development and implementation of a successful textbook reserves program at a major university that targets graduate and upper-level undergraduate students in the two largest departments in the Volgenau School of Engineering: Computer Science and Electrical and Computer Engineering.

Literature Review

The high cost of college textbooks has always been a concern to college students. Recently, this concern has grown even higher, and a number of researchers have studied the reasons for high textbook costs as well as the strategies students use for coping with the situation. Little research has been conducted, however, on the strategies academic libraries use to address the demand for textbooks from their patrons.

According to data from the Bureau of Labor Statistics' Consumer Price Index, the average cost of college textbooks has risen approximately 68.8% from 2001 through 2010.[2] In comparison to this, the overall inflation rate in the US during the same time period was only 43%.[3] In 2009, the average cost of an academic textbook (all subjects) in North America was $107.17, ranging from a low of $57.11 (philosophy/religion) to a high of $138.90 (military and naval science). In the same year, engineering and technology textbooks averaged $113.64.[4] Research conducted at a small number of schools in 2003 and 2004[5,6] found that textbooks can be a significant additional cost for undergraduate students, averaging $898 for two semesters or $1,000 per year including summer school.[5] According to the United States Government Accountability Office, the average amount spent on textbooks and supplies was equivalent to approximately 26% of the tuition and fees at four year public colleges in December, 2004.[7]

Several factors driving textbook cost increases include the bundling of textbooks with CDs, access codes to textbook websites, workbooks, etc., frequent publication of new editions, and lack of used books in the marketplace.[5] Students with limited personal funds may attempt to buy used textbooks,[5] purchase discounted textbooks online, attempt to borrow books from friends, go to the library for current or older editions,[8] use library reserves,[9,10,11,12] make ILL requests for their textbook, or forego course textbooks altogether. According to a study conducted in the United Kingdom, students are buying fewer textbooks but more than 80% said they had purchased textbooks when the instructor strongly recommended it.[8] In a 2004 survey by eBay, 43% of students said that in order to save money, they had chosen not to purchase a required textbook.[6] In the results of a recently published survey, 29% of students at one school indicated that they had avoided purchasing a textbook because of the cost at least once. In addition, 24% said they had taken fewer credits on occasion because of the high cost of books.[13]

Digital or electronic textbooks may be a promising solution to the issue of increasing costs. Electronic textbook sales are currently only a small portion of the college textbook market, but they are growing approximately 50% annually[14] and eventually could become a significant portion of sales. Production and distribution costs are lower for electronic books than print

books and electronic textbooks give students more control over the prices paid for textbooks by offering an alternate format.[12] Electronic textbooks may help alleviate problems with rising costs, but they have limitations. Not all titles are available electronically, the digital copy may be as expensive as the print,[13] access to the electronic copy may be limited to a specific time period (e.g. 120 days), and some students may have limited access to the technology necessary to use digital copies. Moreover, if the library owns a digital copy of a textbook, student access may be limited by the number of concurrent users allowed by the licensing agreement. One of the biggest factors affecting student adoption of electronic textbooks is personal preference. In a 2008 survey of students, 75% indicated that if cost is not a factor, they prefer a print textbook to an electronic textbook.[15]

Academic libraries have wrestled for years with the question of textbooks and what role the library should play in providing access to them. Should textbooks be purchased for an academic library's collection or should they be excluded? Should libraries purchase course textbooks only when needed for course reserves at the request of a professor? Answering these questions and developing sound collection development policies for textbooks is becoming more critical as the increasing cost of course materials places a heavier burden on students and their families. Imler details the increasing number of student requests for textbooks in the university library[16] and how reference staff have responded. McDonald and Burke write that since libraries are service organizations, textbooks should be provided in some manner.[10] One survey of academic libraries found, however, that 61% of respondents had a specific "no purchase" policy for textbooks.[17] Libraries with this policy identified budget constraints as the main reason for not purchasing textbooks. From a collections standpoint, a "no purchase" policy for textbooks makes sense because they may go out of date as new editions are published. Several studies found that the time between the original publication of a textbook and its new edition averaged only 3 to 3.8 years and frequently, the faculty did not see any significant changes to the content.[5,6]

Recently, several university libraries have created textbook collections as part of their course reserves program.[9,10,11] In 2009, the Oklahoma State University-Oklahoma City Library recognized the students' needs for textbooks and began planning a program to place core textbooks on reserve.[9] The Miami University Libraries maintain a "Textbooks on Reserve" collection using library textbook purchases, and faculty and student donations.[10] The Undergraduate Library partnered with the Bookstore at the University of Illinois-Urbana-Champaign in 2005 to offer textbooks on reserve. Through this program, the library rented textbooks from the bookstore, returning them at the end of the semester without adding them to the libraries' collections.[11]

Engineering Reserves Program Development

In Summer 2009, the Head of Interlibrary Loan (ILL) at Mason analyzed ILL borrowing statistics from the previous year and found that 90% of the fifty most requested titles had been requested by students in the Volgenau School of Engineering. The books borrowed most frequently through ILL between January 2008 and June 2009 are summarized in Table 1.

Table 1. Top 20 Textbooks Borrowed through Interlibrary Loan, 1/1/2008 – 6/30/2009

Book Title	**Requests Filled**	**Requests Canceled**
Computer Networking (4th); Kurose	38	30
Designing the User Interface (4th); Shneiderman	37	15
Computer Security (2003); Bishop	35	28
Program Development in Java (2001); Liskov	32	11
Introduction to Data Mining (2006); Tan	30	14
Database System Concepts (5th); Silberschatz	27	10
Designing Concurrent, distributed, and real-time applications (2000); Gomaa	27	5
Understanding Bioinformatics (2007); Zvelebil	24	9
Database Management Systems (3rd); Ramakrishnan	23	17
Advanced Use Case Modeling (2001); Armour	21	13
Routing TCP/IP (vol. 1; 2nd ed.; vol. 2, 1st ed); Doyle	19	12
Discrete Mathematics with Applications (3rd); Epp	19	7
Managing Software Requirements (2nd); Leffingwell	18	24
Network Defense and Countermeasures (2006): Easttom	18	2
E-Commerce: Business, Technology, Society (5th); Laudon	17	16
About Face (3.0; 2007); Cooper	16	18
Modern Control Theory (3rd); Brogan	16	12
Introduction to Software Testing (2008): Ammann	16	12
Official (ISC) guide to the CISSP CBK (2007): Tipton	16	6
Telecommunications (4th); Hioki	15	19

Further research into these requests revealed that:

- 100% of the titles requested by engineering students were identified as IT/Engineering textbooks according to the Departmental Textbook lists kept by the University Bookstore;
- the Mason Libraries already owned 76% of these titles; and
- 83% of the courses using these textbooks were either in the Computer Science or Electrical and Computer Engineering departments.

Student demand for these titles exceeded the number of copies available through ILL from other libraries, resulting in the cancelation of many requests. Since the first students to request the titles were most likely to get a copy, ILL staff were very concerned over inequitable access to these titles. Additionally, most libraries will lend books for only four to eight weeks. When students requested these titles at the beginning of the semester, the books were due well before the end of the course. Students often responded by keeping the books until they were finished using them, jeopardizing ILL borrowing privileges for the entire Mason community from the

impacted lending libraries. Other students would return the books mid-semester and then expect additional copies to be borrowed for them to use for the remainder of the semester. Often, these books were already checked out to other patrons and were no longer available to borrow again, leaving students suddenly and unexpectedly without copies of their required textbooks.

Prior to implementing the Engineering Textbook Reserves Program, the ILL Office staff members reviewed their policies, revising existing ones and adding several new policies, to address problems created by frequent textbook requests. Alterations included establishing overdue policies mirroring the Libraries' existing overdue policy for Mason-owned items, with significant consequences for overdue ILL items. Additional policy changes were also made, including limiting the number of requests a single patron could make for the same title during the same semester and which lending libraries ILL staff could ask to borrow requested titles. In addition to policy changes, the Libraries' existing policy to not request titles through ILL from other libraries that were available to users through the Reserves program remained unchanged. The Head of ILL also worked closely with ILL staff members to codify many unwritten policies and consistently apply them to all ILL borrowing requests. These changes helped ILL staff cope with the requests, but they restricted student access to these titles.

Since 90% of the most borrowed ILL books identified were engineering textbooks, the Head of ILL contacted the IT/Engineering Liaison Librarian to begin exploring solutions to the situation. Ultimately, staff from ILL, Reserves, Circulation and the IT/Engineering Liaison Librarian met to discuss ways to reduce ILL requests for Information Technology and Engineering textbooks and better utilize copies of these books already owned by the Libraries. The group discussed the ILL statistics and several possible solutions, including:

- soliciting reserve requests from faculty;
- creating an open reserves area in the library for these textbooks;
- placing the books on Permanent Reserve; or
- having the IT/Engineering Librarian place the textbooks on reserve as needed.

The group decided that the IT/Engineering Librarian should place the reserve requests for the engineering textbooks because this method:

- provides an opportunity for library outreach to the engineering faculty;
- allows for better oversight of the titles on reserve;
- ensures that texts are placed on or removed from the Reserves area in a timely fashion; and
- gives Library staff greater flexibility in identifying and purchasing new high-demand titles when needed.

In addition, many students are familiar with the course reserves program as it is well used by faculty. During the 2009-10 academic year, Mason faculty placed a total of 12,813 items on either print or electronic reserves for over 800 unique courses.[18]

After further discussion, the group agreed to pilot the program in the Fall 2009 semester and to limit the number of books to fifty due to concerns about available space.

Methodology

The Engineering Textbook Reserves project was piloted on the main campus in the Fall 2009 semester. Given the Reserves space allocation, ILL staff created a list of the fifty most requested engineering textbooks. The University bookstore provided textbook lists for all departments in the Volgenau School of Engineering, and these lists were used to match the textbooks to the courses they supported. ILL staff searched the libraries' print and electronic book holdings to determine which titles were already available at the Mason Libraries. The master list of titles was shared with the IT/Engineering (IT/E) Liaison Librarian, who placed the reserve requests, ordered books that Mason Libraries did not own, and notified the instructors of impacted courses to let them know that their textbooks were on reserve and to provide information about the Engineering Reserves program. Initially, if the Libraries owned a second copy of the textbook or the previous edition of the textbook, both copies were placed on Reserve. After analyzing circulation data at the end of the first semester of the project, the decision was made to keep one copy of the current edition on reserve with few exceptions. For example, the previous edition of a title will be placed on Reserve if there is a delay in availability of the new edition. Once a title was added to the Engineering Reserve collection, ILL requests for it were canceled with an email notification to the student stating that the book was available through the Libraries' Reserve service.

At the end of the Fall 2009 semester, the IT/E librarian and the Head of the ILL reviewed available statistics and assessed the success of the program. The criteria used to determine if the program would continue included the number of circulations for each title, the number of ILL requests received for these textbooks, and feedback from faculty and Reserves staff. The decision was made to continue the program for Spring 2010 because:

- more than half of the Reserve items circulated five times or more during the first semester;
- ILL staff noticed a decrease in the number of borrowing requests for textbooks received; and
- feedback from both Reserves staff and IT/E faculty involved with this program was positive.

In January 2010, the IT/E librarian used the list of identified courses and updated the engineering textbooks list for the Spring 2010 semester. Since then, the IT/E librarian identifies engineering textbooks of potentially high demand and places them on reserve each semester. In addition, ILL staff monitors the incoming borrowing requests to identify other engineering titles for inclusion in the Reserves program.

Results and Discussion

The program's outcomes for FY2009-10 and FY2010-11 are summarized in Table 2. The IT/E librarian placed a total of seventy-one unique titles on reserve during the first four semesters of the program. In addition, ten titles were also available electronically. The number of titles on reserve during FY2009-10 was higher than in subsequent semesters as the IT/E librarian

attempted to determine which titles would be the most used. By reviewing circulation statistics at the end of each semester, the IT/E librarian identified sixteen titles that were never borrowed and removed them from reserve.

The reserve books served students in seventy different courses, eighty-six percent of which were at the graduate level. The average semester enrollment for these courses was 1,284 students.[19]

Table 2. Engineering Textbook Reserves Statistics, Fall 2009 through Spring 2011

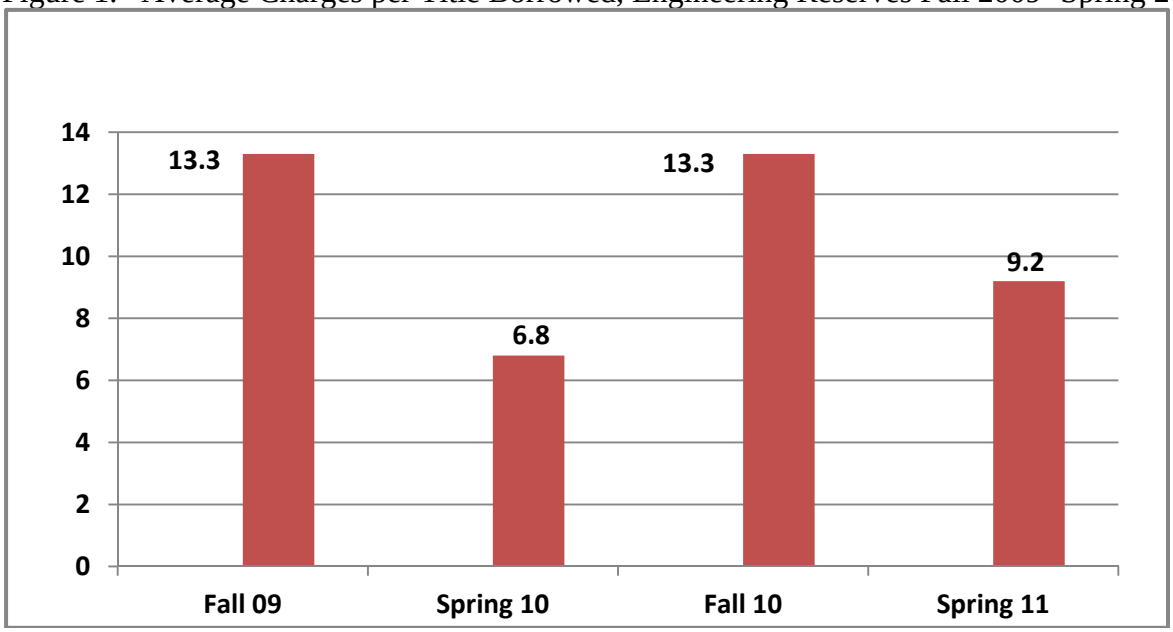
Statistic	Value
Number of Unique Titles	71
Number of Titles Also Available as E-books	10 (14%)
Number of Unique Courses	70
Average total enrollment per semester	1284
Total Charges Recorded	1531
Average charges/semester	383
Average charges/title borrowed	28
Average charges/title borrowed per semester	7
Total Charges, Top 5 Titles	772 (50.4%)
Total Charges, Top 10 Titles	983 (64.2%)

Overall, use of the engineering textbooks on reserve has been strong. During the four semesters, the total number of charges recorded was 1,531 with the average book borrowed by students seven times per semester. The top five titles borrowed account for approximately 50% of the charges during the life of the program, with the most borrowed title (a 1991 text on control systems theory), accounting for 16.7% of the total circulation during the same time period.

Semester borrowing trends can be seen in Figure 1. Borrowing of the reserves texts has been heaviest during the fall semesters and lighter in spring. Factors contributing to this trend include:

- fall classes tend to be larger and textbook shortages may occur;
- students on financial aid may experience delays in receiving their funds, and thus defer textbook purchases; and
- the availability of used books for sale may be higher in the spring than the fall.

Figure 1. Average Charges per Title Borrowed, Engineering Reserves Fall 2009 -Spring 2011



Prior to the start of the engineering reserves program, ILL staff borrowed approximately 240 engineering textbooks per semester from other libraries to fill students' requests. Approximately 140 requests for engineering textbooks were not filled each semester due to the limited number of copies available to borrow from other libraries. The average success rate to fill engineering textbook request was 63%. Since the start of the program, all ILL borrowing requests for these titles are canceled by ILL staff and students are directed to use the copies on Reserve. During this same time, ILL borrowing requests received for engineering textbooks have decreased. This reduction in requests and their subsequent cancellations can be seen in Table 3. To project savings to the Libraries, the assumption was made that textbook borrowing would have continued at historical patterns had the Engineering Textbook Reserves Program not been implemented.

Table 3. Interlibrary Loan Cancellations for Books on Reserve, Fall 2009 through Spring 2011

Semester	**Number of Cancellations**
Fall 2009 (8/1-12/31)	144
Spring 2010 (1/1-6/30)	91
Fall 2010 (7/1-12/31)	59
Spring 2011 (1/1-6/30)	38

Over four semesters, ILL staff would have borrowed approximately 960 books for engineering students. In its 2002 Interlibrary Loan cost study, the Association of Research Library (ARL) determined that it costs $17.50 to borrow an item from another library.[20] Given the estimated items that would have been borrowed and the cost per item to borrow from other libraries,

supporting engineering students through ILL requests would have cost the Libraries $16,800 over four semesters.

Since the Libraries initially owned 76% of the titles used for this program, the cost to purchase additional titles has been minor. Twenty-five books costing $3,130.68 were purchased for the program during the four semesters. The program's net savings of $13,669.82 (Table 4) is calculated by subtracting the purchase cost of new books ($3,130.68) from the estimated ILL borrowing costs ($16,800).

Table 4. Estimated costs and cost savings for Engineering Reserves Program, Fall 2009-Spring 2011

Average cost to borrow a book through ILL	$17.50
Number of books not borrowed (estimated)	960
ILL Savings (estimated)	$16,800.00
Number of books purchased (actual)	25
Average cost per book (actual)	$125.23
Cost to purchase books for program (actual)	$3,130.68
Net savings to Library	$13,669.32

The average prices of the books (by format) in the engineering reserves program during Fall Semester 2011 are provided in Table 5. Like many other college bookstores, the University Bookstores offer students options to buy used copies; buy or rent electronic copies; or rent print copies. As seen in Table 5, the costs of books obtained through one of these alternatives can be significantly less (as much as 45.2% less) than buying a new copy; unfortunately, not all titles are available in all formats.

Table 5. Bookstore Price by Format of Engineering Reserves Books, Fall 2011

Format	Average Price per Title	# Titles Available
Print –new	$119.46	42
Print—used	$ 89.59	42
Print—rental	$ 65.42	18
Electronic—buy/rent	$ 84.25	14

Monitoring the usage of electronic books in the Mason Libraries' collections by students in these courses is difficult. While usage statistics are available at the title level for these books, it is impossible to determine how much of that usage can be attributed to students in these courses as no additional login is required to access the electronic books. A survey of students in these classes would help determine which format is preferred.

Conclusion

The Engineering Reserves Program has met its goals of alleviating ILL demand for engineering textbooks and increasing student access to titles already owned by the Mason Libraries. One unanticipated benefit of this program is that the University Libraries saved money in direct ILL borrowing costs through the implementation of this program. No books available through this program have been borrowed through ILL from other libraries and fewer suspected textbook titles have been requested by ILL users. The program's success may be related to the limits on its size. ILL staff recognized a need within a specific population of students, thereby limiting the scope from the outset. Administering a reserve program such as this one for every academic department may go well beyond the staff and fiscal capabilities of many academic libraries.

Many university libraries could employ a program similar to the engineering reserves program without overly large investments of library funds or staff time. At Mason Libraries, a significant percentage of the required textbooks were already part of the engineering collection (most were received via approval plans), so actual purchases were minimized. Most of the books that were purchased were newer editions or were replacements for books that disappeared from the stacks when they were removed from Reserves. Textbooks that are not required in a given semester may be left on reserve in order to prevent their disappearance.

The staff time invested in the program was highest in the first semester during the development of the program and associated work flows. The program is no longer as labor intensive as it was because work flows have been streamlined and the revision and implementation of ILL policies have affected the amount of time ILL staff spend processing textbook requests. Searching for current textbook titles and their associated courses is much easier now as a result of changes to the search tool on the University Bookstore website.

Assessment of the Engineering Reserves Program is very important to ensure its future success and should include a review of borrowing statistics, feedback from faculty and students and feedback from library staff. To date, feedback from all involved parties has been informal and unstructured. To gather structured data, the Mason Libraries are planning to conduct a survey beginning in Spring 2012 to help assess the impact this program has had on faculty, students and library staff. This will help ensure that the program will remain relevant in the future.

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