Physical vs. Digital Scholarship: Exploring Academic Resource and Information Access in a Networked Environment.

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Abstract

This study explores some aspects of library use and academic information seeking behaviors of patrons of an academic library in a graduate school of education in the Northeastern United States with the purpose of finding out the impact of library digital resource availability on the use of its physical structures. Using logs of data on daily patron traffic through the library's physical spaces and corresponding logs of daily accesses of the library's website over the course of one academic year, the study analyzes user activity patterns of the library's physical spaces in conjunction with patronage of the library's digital resources. Findings indicate a lack of impact of digital resource availability and access on physical library use, but reveal patterns in information seeking activities for both physical and digital resources which have implications for academic information management.

Purpose

In the current information age, and with many higher education institutions beginning to implement virtual learning environments while academic libraries are converting their unique holdings into digital formats and making them available online, authorities are naturally concerned about whether (and how) students make use of academic libraries' physical structures that have long supported traditional teaching and learning practices (Spennemann, 2006). Studies on academic library usage and user perceptions surveys have therefore been reported (e.g. Baker, 1997; Bancroft, Croft, & Speth, 1998), but there appear to be no reports in the literature on studies that tie usage patterns of a library's physical spaces to usage of its digital resources.

This study therefore sought to explore possible correlations between academic library users' physical activities within the library and their usage habits on the library's virtual environment with the purpose of contributing to the evolution of best practices for optimizing overall educational resource availability within the academic community.

Theoretical Perspective

As a qualitative case study, the main theory that guided data interpretation was Grounded Theory, the basic tenet of which is that a theory must emerge from (or be grounded in) the data (Glaser & Strauss, 1967). This inductive approach thus emphasizes the use of "real world" data and a systematic set of procedures to develop a grounded theory about a phenomenon, rather than deductively generating theories in abstraction. The intent of this approach is to develop an account of a phenomenon that identifies the major constructs, or categories, their relationships, and the context and process, thus providing a theory of the phenomenon that is much more than a descriptive account (Becker, 1993). In this study, grounded theory served as a perspective with which Transaction Log Analysis (TLA) was used to identify typical usage patterns of the library's physical and digital resources, with the hope of establishing possible relationships between both methods of library resource use.

Data Sources and Methods

The academic library under study is one of the nation's largest and most comprehensive research libraries in education, with collections of about 500,000 printed volumes, and occupying 4 floors of a large building within the university. The library also runs a website that provides access to substantial non-print collections and over 16,000 online subscription databases in almost every academic area. Most of the library's resources are therefore accessible to all members of the university community both in person and online. This study covered one academic year (2008-2009, excluding summer) of user activities on both the library's physical premises, and its virtual platform.

Transaction Log Analysis (TLA), defined as the study of interactions registered electronically between online systems and persons who use these systems, was the main methodology of this study. As a non-intrusive and non-interactive method of gathering data, TLA has long been used to assist in measurements of user interactions on websites, as well as address issues relating to system performance and information structure (e.g. Moukdad & Large, 2001; Park, Lee, & Bae, 2005). On its own, TLA as a methodology for studying user behavior has its shortcomings, but for studies dealing with physical actions of users, as in the case of this study, TLA is extremely beneficial as large volumes of credible data can be seamlessly obtained from all users of a resource for any given time period.

Measuring Patronage of the Physical Spaces

For the purpose of this study, the physical estate of the library that is accessible to patrons was placed in 4 sections:

1. A first floor that houses a circulation desk, shelves of reference material, meeting rooms, computer workstations and printing facilities. It has a maximum seating capacity of about 100, but is generally the first "port of call" for patrons and visitors to the library.

2. A second floor comprising of a large section which serves as a collaboration space, and another section that contains book shelves and banks of computer workstations, many with multi-media capabilities. This floor has a seating capacity of about 200.

3. A third floor reading space and meeting rooms (limited computer workstations or shelves) with a maximum seating capacity of about 200.

4. Four floors containing stacks of all the library's print collections (patrons only go in here to pick books and there are no seats or computer facilities)

All spaces in the library building are covered by a wireless network allowing access to all library and campus resources to all computers with wireless network cards. Wireless sensors placed on doorways leading to each of these sections of the library detect and count individual patrons as they enter and exit these premises. These sensors transmit

their respective cumulative counts at half hour intervals to a server where, upon retrieval, data is available on the number of times patrons enter and exit the respective sections per hour, day, week and month.

Traffic data for the period under study (September 1, 2008 - May 31, 2009) was thus retrieved, sorted and combined (using Microsoft Excel) to yield daily, weekly and monthly values of entrances and exits for each section. In this study however, only entry counts between 8.00am and 10pm (i.e. period the library is typically open) each day were considered for analysis. The library is open every day except for a small number of holidays and the Christmas-New Year break (December 25 - January 1 inclusive).

It is however worth mentioning that values obtained from the counters do not represent the absolute numbers of unique individuals entering a particular section, but numbers of times people pass through the doorways (multiple entries by a particular individual are recorded multiple times).

Measuring Patronage of Digital Resources

The interface of the library website comprises the homepage and several other subsidiary pages that contain links to various internal and external resources and services. Users typically come to the site through the homepage either by clicking on a link on another website, or by typing the URL directly in the browser. In either case, a successful request is logged on the server as a "hit" or "visit" on the homepage together with details such as the identity (IP) of the requesting computer, the date and time of request etc. Over any given period of time, these records, known as *web sever logs* or *transaction logs*, can be retrieved from the server as text files, thus providing an up-to-date chronological list of the individual requests. These files, however, can be very large, hence server administrators typically use software to clean and parse the logs so they can be displayed in a spreadsheet for easy viewing and analysis.

The researchers of this study thus requested pre-treated log data for the period between September 1, 2008 and May 31, 2009. This data contained records of all successful hits on links on the website, with each record containing the date, time, identity of link clicked on, and origin (i.e. from University or off-campus computers) of request. However, for fair comparison with the physical traffic, only data on visits to the homepage by on-campus users that were recorded between 8am and 10pm each day were eligible for analysis. This data was also treated in Microsoft Excel to yield values of daily, weekly and monthly patronage of the website. As in the case with the physical traffic, the data represented user traffic on the site (as multiple clicks by a single user are recorded multiple times) over the given period, and not the number of persons accessing the site.

Working from a Grounded Theory perspective, the respective data were sorted and combined in different ways - weekly, monthly, weekdays, weekends, nightly etc. The various parameters of the two main categories (physical access and digital access) were
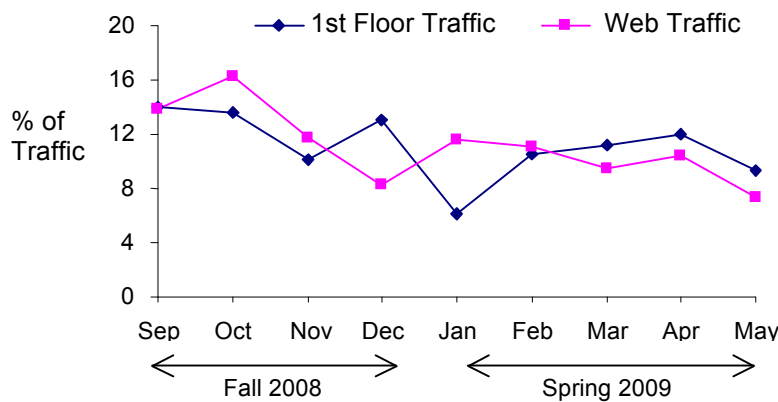
then compared - visually by charting respective percentage values, and statistically by computing correlation coefficients of trends.

Summary and Discussion of Some Results

Fig.1. Total traffic through the main sections of the library for the period under study
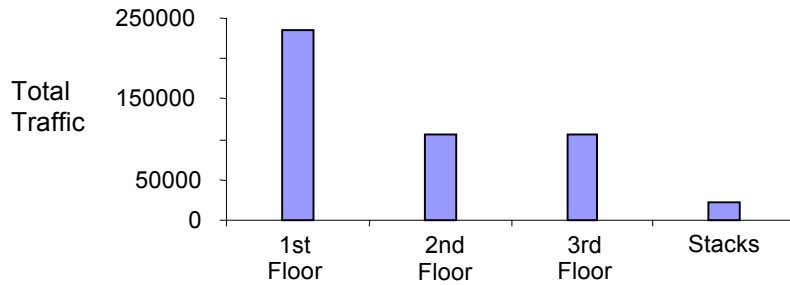
Fig. 2. Comparison of Monthly Trends of Traffic through the First Floor and the Website

Fig. 3. Comparison of Monthly Trends of Traffic through the Reading Room and the Website
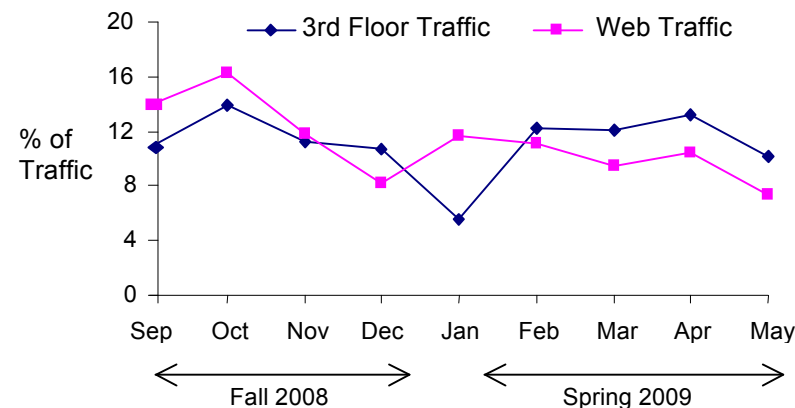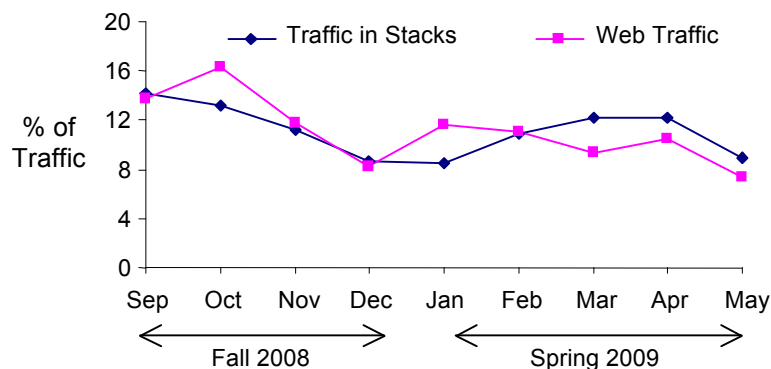
Fig. 4. Comparison of Monthly Trends of Traffic through the Book Stacks and the Website

Some observations and inferences made from these and other charts include:

1. As expected, book stacks are the least visited section of the library, while the front desk/computer facility section is most patronized. The sections for reading and meetings (i.e. 2nd and 3rd Floors) not only enjoy equal amounts of patronage, but exhibit a near perfect positive correlation (Pearsons' r = 0.978) in monthly trends of usage.

2. The fall semester witnessed higher general patronage of the library's physical and digital resources than the spring. However, December recorded the lowest amount of website traffic, while January recorded the lowest physical traffic. Subsequent studies will confirm whether or not these are recurring phenomena, and the possible reasons.

3. Physical and cyber traffic trends are similar when school is in session, but show some disparity during the inter-semester break. This is mostly because of the library's closure for a two week period during the break, making it inaccessible physically. In this situation, the web traffic picked up from a previous downward trend during most part of the semester.

4. The trend of monthly patron visits to the website correlates more positively with the trend in visits to the book stacks (Pearson's r = 0.672) than with the trend of visits to the reading rooms (r = 0.235). Same is the case with trends in daily visits (not shown in graphs), and since the reading rooms contain very little print material, it can be inferred that they are patronized more for their physical space than for accessing the library's collections.

The data so far reveal that as long as the library is open, its physical structures and spaces enjoy just as much patronage as its digital resources. Concerns about libraries enjoying a reduced patronage due to the increased availability of digital resources and services are thus not supported, though further studies are needed to confirm this. In terms of information access and use however, findings are currently inconclusive, but the emerging patterns suggest a similarity between physical and digital information seeking

and access habits among patrons. Also, the library premises remain popular as desirable places for quiet study and academic discourse, judging by the traffic trends through these areas when school is in session and during the inter-semester break. More elaborate discussions on these will however be made in the final presentation.

Concluding Remarks

The growth of online learning, particularly in higher education, is transforming academic libraries as these libraries are increasingly granting remote access to, (and electronic delivery of) their collections through virtual environments, thus removing the need for visits to the physical library. In addition, librarians are being urged to change their roles from information providers to educators, and thus shift focus from explaining library resources to meeting the ongoing information needs of the learners in the broad information environment (Lippincott, 2002). These developments, coupled with the fact that other electronic tools such as Google Scholar are affording fast and easy access to scholarly information and authoritative collections (Detlor & Lewis, 2006), seem to be rendering traditional "brick-and-mortar" libraries obsolete. Educators are therefore confronted with the challenge of continuously ensuring optimum academic resource availability through the library systems, especially as most valuable learning and research materials are still print-based and thus inaccessible electronically.

Addressing this challenge will however begin with understanding the usage patterns of a library's physical facilities as patrons increasingly rely on electronic sources for their learning and research resource needs. This study is contributing towards such understanding, and consequently helping in shaping the future direction of academic information delivery practices, by shedding light on trends and patterns of usage of a library's resources in an educational institution, and helping lay the foundation for future studies whose findings will ultimately help educators and librarians re-evaluate the way they develop, manage, and deliver learning resources and services.

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