Users, Technology and Space in Libraries in the Digital Age
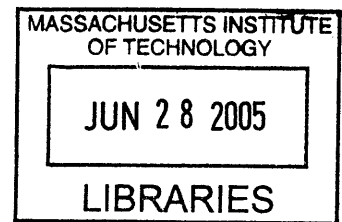
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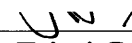Degree of Master of Science in Architecture Studies
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1

Users, Technology and Space in Libraries in the Digital Age

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Abstract

This thesis is a user research study of emerging issues in the use of libraries as public spaces and as information repositories in the digital age. Till recently strong physicality was attached to the library with the only access to its information resources being visiting the library premises. The availability of the Internet, digital documents and wi-fi has brought about unprecedented changes in the function, use and operation of libraries today. The environment of evolving technologies is bringing about a variety of new user practices that creates ambiguity for the future of the library as an institution as well as an architectural space. This study attempts to identify various issues in the use of library spaces today through the means of qualitative and quantitative data collection methods. Four libraries differing in the technology and quality of space provided have been chosen as case studies. The shifting physical form and meaning of the library's architectural space and its implications for the design of future libraries will be examined. A set of recommendations for better user experience in present and future library spaces will be part of the research.

Thesis Supervisor:

William J. Mitchell
Title: Academic Head, Media Arts and Sciences and Alexander W. Dreyfoos Professor of Architecture & Media Arts and Sciences

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Table of Contents

1. Introduction

Libraries are one of the oldest physical institutions of information and learning that have also served as social institutions. According to Panizzi, the principal librarian at the British Museum Library in the 19th century, 'a library is not a show but an institution for the diffusion of culture' (Pevsner, 1976).   Originally, as part of larger institutions like museums, temples and churches and later as part of universities and independent bodies, libraries have been strong institutional symbols. Not only have the grand libraries of the past been important sources of information but they have also been strong architectural and urban symbols signifying the trends and culture of the times. In the past they have told us the story of where we came from and where we were going and so will the libraries of today.

Older libraries maintained exclusivity in use by providing access only to the privileged scholars and the rich in the society. While many university libraries existed, 19th century saw the development of the library as a 'public' institution devoted to the preservation of liberal learning. Public libraries that grew out of capitalistic interests during and after the industrial revolution soon became products of altruism and democracy in societies in Europe and North America. Promoters of the public library at that time felt that libraries offered a greater good than reason: they offered happiness as well (Battles, 2003). Public libraries have become important public spaces today much like parks, theatres, cafes, shopping malls etc. in urban metropolitan areas in the United States of America. Not only are they sources of information and learning, but they also instill a sense of community by organizing social events like book clubs, children's educational programs, exhibitions etc. With the developments of the technological revolution in the last decade, most of the university libraries and major existing public libraries in the USA have embraced technology to empower their patrons with the latest means of information access. Many universities have redesigned their libraries to accommodate the ever-increasing print collection with access to the digital collection and to provide environments embedded with state-of-the art technology to deliver optimal learning and instruction. In the age of digitization, some of the public libraries also strive to create 'vibrant' public spheres in addition to providing access to information.

The present environment of evolving technologies and various means of access to information has generated diverse use of library resources resulting in ambiguity for the future of the physical library and its user space. In such a scenario it becomes essential to observe and study the user behavior and needs to understand the changes in use being brought about by new technologies and to identify a design strategy for library as an architectural and public space.

1.0 Goals of the Study

From clay tablets and papyrus scrolls to digital documents today, libraries have used various technologies to achieve the common goals of preserving, transmitting and sharing information for generations of mankind. Different storage media, technologies and social forces have shaped library's architectural interior and exterior. Heretofore, strong physicality was attached to the library with the only access to its information sources being visiting the library premises. Most changes in libraries before the information technology revolution were related to the change in storage media or increase in storage requirements that only changed its physical form. Today, remote network access, digital documents and the Internet are changing the function, use and operation of libraries challenging its physical significance, existence of books and librarians.

With the availability of the Internet, the use of library facilities for its resources like journals, monographs, catalog, visual collections and librarian consultations has remarkably reduced. On the other hand, the introduction of wireless technology (wi-fi) in the space has made it a popular destination for users of laptops. The space is being used more as a workplace, like the Starbucks café. Libraries are also becoming vibrant social spaces with the use of mobile devices like cell phones, Personal Digital Assistants, access to email and online chat and the ability to work in groups. In spite of the conversion of print to compact digital media, the space requirements for libraries to provide both physical book stacks and access to digital information are increasing. The use of wi-fi is making its interior architectural layout more flexible making ad hoc group formations and spontaneity in work possible.

Through this study I attempt to observe the aforementioned changes in depth, identify the conventional and unconventional uses of library spaces today and analyze the user interpretations of the function and meaning of the space. The study will involve analyzing different public and individual user behaviors brought about by different kinds of physical library environments. Based on the results of the user study, the shifting physical form & meaning of the library's architectural space and implications for design of future libraries will be examined. A set of recommendations for better user experience in present and future library spaces functional both as information sources and public spaces will be established.

1.1 Why is this study important?

According to Ann Wolpert, The Director of Libraries at Massachusetts Institute of Technology – *'User research and evaluation in libraries has so far mainly focused on usability testing to study the information seeking behavior of users but very few studies have dealt with the question of user behavior in relation to interaction with available technology in the physical space.'*

The Office of Metropolitan Architects (OMA) states, *'The Library's insistence on one kind of literacy has blinded it to other emerging forms that increasingly dominate our culture, especially the huge efficiencies (and pleasures) of visual intelligence. New libraries don't reinvent or even modernize the traditional institution; they merely package it in a new way'* (OMAbook, 1999).

Although there have been hundreds of studies of library users and their information-related behaviors, relatively little of this research has focused on libraries as a type of social activity space (Given, Leckie, 2003).

In the light of these statements and the observed changes in use and function of library spaces, answering questions about who the 'users' are and what are they doing in libraries become crucial in designing present and future library spaces.

As part of this study, it would be useful to begin with an analysis of the evolution of the library as an institution and an architectural form with changes in society, culture of learning and storage media.

2. Libraries of the Past

The earliest archeological evidence of a library-like collection was found in Sumer (3500 BC) where diggings have found temple rooms full of clay tablets in cuneiform script. The content of the tablets was mainly related to commercial transactions or inventories and only a few tablets touched theological matter and legends (Wikipedia). The use of clay as a storage medium saved the Sumerian scripts from destruction for many generations to come. The archeological evidence also suggests the existence of a catalog and an organization method for the collection of clay tablets.

The royal Library of Alexandria in ancient Egypt, believed to be part of the royal museum, is described as a room or building where a collection of reading matter was stored for reading or reference in the 3 B.C. It was the most significant library of its times with 200,000 to 700,000 papyrus scrolls. It was mainly a private collection open to the educated public. Records suggest the existence of librarians and an organization system for scrolls in this period. Librarians got the scrolls from the stacks for the readers, as they were not allowed to access the stacks directly (Battles, 2003). Many libraries of this time were destroyed by fire or closed down due to conquests and change of regimes resulting in the loss of very significant literature of its time. Vast collections of reading matter signifying a regime's culture and religion were not allowed to exist and be transmitted after a take over.

The imperial library in the Han Dynasty in China is believed to have been the first to establish a library classification system and the book notation system. Their library catalog was written in scrolls of fine silk and stored in silk bags (Wikipedia).
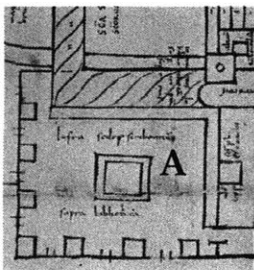
A scheme for the abbey of St. Gall c.820 - Monastic library (A) beside the apse Source: Pevsner 1976

The formal library started coming into existence after the Christian re-beginnings in the late 6th century. This was also the period when the scroll had changed into codex and papyrus into vellum. These libraries were limited to the Christian monasteries where the monks read books kept in cupboards. Niches, choirs and vaults were used as spaces to store the books. Carrels- a working niche or alcove in a library was also common in the Middle Ages for monks to read and write in (Pevsner 1976).
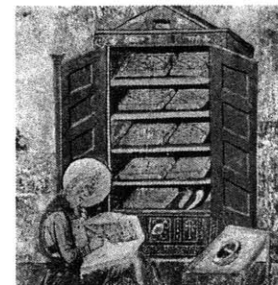
Detail of a carrel: the scribe Ezra, late 6th c. Source: Pevsner 1976

As towns and secular learning grew, more and more writing was undertaken (Clausen 2005). This saw the emergence of detached academic libraries like the Sorbonne Library in France. Even though the library was not physically part of another building, its program continued to be attached to an institution. In the 14th century, as books became expensive, university libraries started chaining them to lecterns instead of keeping them in cupboards. The lecterns were paired back to back with each pair having a window. With the invention of printing, book production multiplied proving the lectern system wasteful. A new system called the 'stall system' emerged in which shelves were added above the lectern.
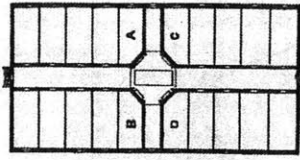
The Karlsruhe library, 1761- reading room in the middle at the cross of gangways. A, B, C& D are narrow rooms lined with books each ending in a window. Source: Pevsner 1976

In the Reformation movement of the Renaissance period, many of the monastic libraries were destroyed and secular libraries established to educate common people. Lecterns and chaining remained in these libraries but now the lectern areas (reading areas) were now separated from gangways – a form of library plan with nave and aisle emerged.

During Queen Elizabeth's reign in England, a new type of library type emerged – 'Saal style' or the wall system, which later spread to other European libraries. In this system the bookcases were arranged along the wall making the hall very spacious.

Internal as well as external monumentality in architecture in libraries were introduced in English libraries in the early 18th century. Libraries of this time were marked with excessive waste of space with the book storage done through the wall system.

Oxford Corpus Christi College library – stall system, 1604 & 1700 Source: Pevsner 1976

Oxford, All Souls, Codrington Library 1715- 40- Saal Style Source: Pevsner 1976
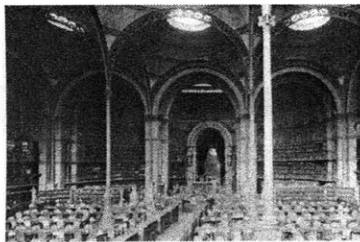
Bibliotheque Nationale, 1865 –68, Paris Source: Pevsner 1976

As books became cheaper, chaining became unnecessary. The next innovation in the library plan appeared in the early 19th century with the separation of the stacking area from the reading room to accommodate the ever-increasing number of books. Other novel architectural feature that can be seen in libraries of the 19th century is the extensive use of iron columns & arches and glass domes as in the Bibliotheque Ste Genevieve (1843 – 50) in Paris, the British Museum Library (1854 - 56) in London and Bibliotheque Nationale (1865 - 68) in Paris.

One of the most important developments in the field of libraries came in the 19th century with the growth of public libraries that took place simultaneously in England and North America.

The formation of public libraries saw the institutionalization of the library system. This class of libraries became independent architectural as well as institutional bodies. Public libraries provided free access to books for citizens of a city. Many of the American Public libraries borrowed their architectural style from past Parisian architectural styles. For example, the Boston Public Library's exterior architecture was inspired from Bibliotheque St Genevieve in Paris. The trend of borrowing
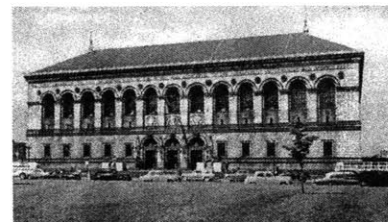
Boston Public Library, 1888-92 Source: Pevsner 1976

from classical historical styles in library architecture in the United States of America continued till well into the 1920s (Clausen, 2005).

The libraries in 1950s and 1960s in North America and Europe were based on Modern style of architecture in their use of industrial materials (metal and glass) and processes (standardization and prefabrication) and lack of ornamentation. As the need for storage grew with the increasing number of books, 'compact shelving', a method of moving shelves on tracks, was introduced to save space.

Since its formal existence, all library buildings have been centered on the book, rectangular or circular in plan with circulation, stacks and reading room previously combined and then segregated. The different stages in the library's development were brought about by changes in information storage medium and existing social forces. The library evolved from being physically part of monasteries to independent structures that belonged to larger institutions like universities and later to the general public. Historically, most of the changes in the library dealt with changes affecting its plan and physical form but its function as a repository of books and information remained constant. But in the last few years, digital technology and remote access networks have brought about unconventional changes in library design, function and use as discussed in the case studies in further chapters.

3. Methodology

I outline my research design as a combination of qualitative and quantitative data collection methods in selected libraries. The libraries selected as case studies are:

New York Public Library (Humanities and Social Sciences Research Library)
New Seattle Central Public Library
Dewey Library at Massachusetts Institute of Technology (MIT)
Stata MIT Libraries Information Intersection at MIT

A combination of university as well as public libraries as case studies has been chosen to get an insight into the 'breadth' of changes occurring in the usage patterns of libraries and to not be limited to the knowledge of usage patterns only in one program of libraries. Dewey Library (opened in 1964) and the New York Public Library (opened in 1911) were chosen as older libraries retrofitted with new technologies. The Stata MIT Libraries Information Intersection (opened in May 2004) and the Seattle Central Public Library (opened in May 2004) were chosen for their contemporariness and novelty of design. This choice of case studies provided an insight into the differences and similarities in user behaviors in new spaces designed for technology and old spaces retrofitted to accommodate technology.

The **qualitative** methods included unobtrusive **'participant observations'** and face-to-face **informal interviews**. The best way to find out what users are doing in the public spaces is through observation and immersion over a considerable amount of time in these spaces. Ethnography is an excellent methodology for developing thick descriptions of users' activities, communications and everyday lives (Gupta, 2004). One such ethnographic method is 'participant observation'. As part of participant observations, the author visited the case studies to use the space like other patrons did and observe their usage of space. The author took detailed notes of how patrons were using the library facilities, information resources, personal devices and their interaction with friends, co-present others and librarians. The author made a record of the activities, personal belongings and approximated profiles of randomly selected users to provide a comprehensive idea of the user space in each library. Key areas observed for the study were - reading rooms, circulation and reference desks, group study rooms, public computer terminals and other public areas of the libraries.

Informal interviews were also conducted with patrons and librarians regarding patron use and their information access patterns within and without the space.

Following methods were part of the **quantitative** data collection:

A **survey questionnaire** was administered to 15 users at each MIT case study (total 30 users). The survey could not be conducted at the public libraries due to their strict patron privacy policies. The questionnaire was designed to achieve the following:

- Understand who the users are – not by name but by age groups, education level, where they lived and their affiliations to MIT. This would reveal user location and group pattern.
- Understand the usage patterns of the library through:
  - o Responses to questions obtained on a quantitative scale of 1 to 5 to gauge the library features that are most important to users
  - o Responses to questions related to satisfaction level of each important feature that was also obtained on a quantitative scale of 1 to 5. This helped in deriving a relationship between the features that are important to users and their corresponding satisfaction level
  - o Identify the conventional and unconventional, group as well as individual activities in libraries
- Understand the mental interpretations of the library as a space and as an institution in the digital age

The questionnaire was pre-tested with five library users and colleagues before it was officially administered. This helped in refining and rethinking the questionnaire design.

Visual evidence of user activity with the help of **photographs** and **user – space location mapping** was an important part of the quantitative data. As part of the mapping, locations of users of a selected space were recorded at hourly intervals either with the help of photos or markings on the plan of the space. This method generated a pattern of space use across the time period of a library's working hours. Photographs of library's interiors, furniture layout and user activity were taken to study the adaptations and innovations in library space design and its subsequent use.

4. Case Studies

4.0 The Humanities and Social Sciences Library of the New York Public Library – A Case for the Co-existence of the Old and the New

4.0.1 Introduction

The New York Public Library (NYPL) consists of four major research libraries and 85 branch libraries located in the Bronx, Manhattan and Staten Island.

The present Humanities and Social Sciences Library /Central Library, officially opened on May 23, 1911 was the first building constructed for the NYPL. The Central Library stands between the 40th and 42nd street on the fifth avenue in midtown Manhattan. The restored and revitalized Bryant Park of Manhattan characterizes the library's backyard. The library received 30,000 to 50,000 visitors on the first day of its opening and today it receives about 16 million people annually and in this age of cyberspace, countless more through the portals of the library's website. Among its earliest beneficiaries were recently arrived immigrants in New York, for whom the Library provided contact with the literature and history of their new country as well as the heritage that these people brought with them.

The central building of the NYPL is one of the most familiar landmarks in the United States. The large marble building guarded by its two stone lions is two city blocks long and was designed in the classical style by John Carrère and Thomas Hastings. It is notable not only for its collections but also for its architecture, sculpture, ornamentation, and decoration. That it has captured the imagination of scholars and researchers is beyond question; equally notable is its appeal to the general public. E.B. White noted in *Here is New York* (New York: Harper and Brothers, 1949) that New Yorkers have the opportunity, even if they do not exercise it, to spend an "afternoon in the great rustling oaken silence of the reading room of the Public Library, with the book elevator (like an old water wheel) spewing out books onto the trays (p. 20)" (www.nypl.org).

Over the years the original space for readers in the library diminished as other functions such as copy services, microforms and card stack storage encroached on it. Layers of dirt, water damage, and heavy usage left the reading room looking makeshift and tired. In addition to the need to preserve the reading room, the library faced an increasing demand to provide access to electronic information (http://www.davisbrody.com/print.cfm?projectID=16575).

In 1998, after nearly nine decades of wear and tear and makeshift alterations, the grand reading room of the library was returned to the Beaux-Arts grandeur envisioned by architects of the original building and given an infrastructure for electronic resources that has been seamlessly integrated into the historic structure (http://www.nypl.org/press). The team of restoration architects adapted the room to maximize efficiency of library service while maintaining its historic and aesthetic integrity.
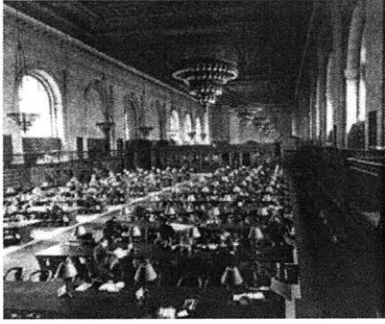
The NYPL reading room before restoration
Source: www.nypl.org

Present NYPL reading room after
restoration Source: www.nypl.org

The Spatial Characteristics and the System Within

The library is characterized by seven underground floors of 'closed book stacks' inaccessible to the public, eleven reading rooms (main and subject specific), the Bill Blass Public catalog room, classrooms, an exhibition hall and two galleries. The library includes over 88 miles of   high density, mobile book shelving under the library and a recently added 40 miles long, two-level underground storage under the Bryant Park. The main reading room is a majestic public space, measuring 78 feet by 297 feet—roughly the length of two city blocks (http://www.nypl.org/). It is divided into two sections by a long library service desk that includes the dumbwaiters, book return and book delivery desks. The reading room can accommodate about 624 users at a time. The restoration of the reading room was completed in 1998 to weave together Old World architectural elegance with modern technology. Along with the open-shelf 'general reference section' (over 25,000 volumes), the reading room now invisibly wired, provides laptop-docking service (accessing library's Ethernet) for patrons and 48 public computers to access electronic databases & journals and the Internet (Figure on the next page).

A

Combined reading room for books, public computers & laptops

Bryant Park

A | A

B

D
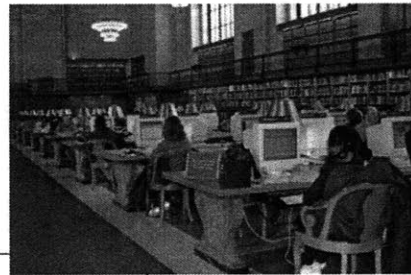
B *Renovated Catalog Room*
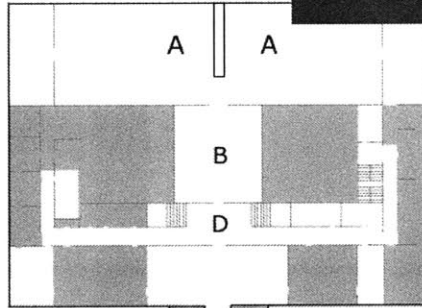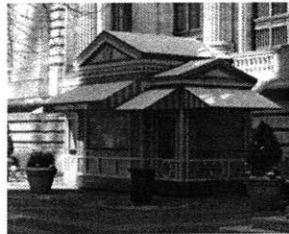
C

*Starbucks kiosk on the ground floor, **outside** the library building*

C

Third Floor Plan – NYPL Central Library
Plan source: www.nypl.org

■ *Administrative Areas*

□ *Public Areas*
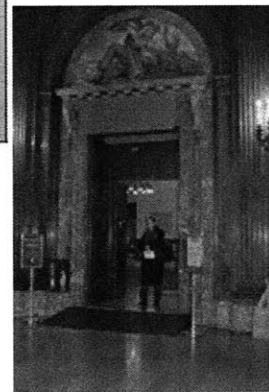
D *Lobby*

There are presently 42 oak tables, each seating up to 16 readers (total of 624 seats; before renovation- only 490 seats). To keep up with the challenge of bringing 21st-century technology into the room while maintaining its original aesthetic integrity, the oak tables were retrofitted with custom designed fixtures for users to plug in their mobile devices (mainly laptops) and to provide Ethernet connections.

In the Bill Blass Catalog Room more than 1000 requests are submitted everyday (www.nypl.org). Before the advent of the NYPL digital catalog in 1972, the catalog room consisted of card catalogs. The card catalogs are now replaced by computer workstations that provide access to the CATNYP, the NYPL electronic catalog and an electronic resource menu offering well over one hundred subscription databases. The material from the old catalogs (1911-1971), which had deteriorated into dog-eared and dirty cards some of which were hand-written, was collated

The catalog room- all users accessing information through computers – none at the dictionary catalogs in the background

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into an 800 volume Dictionary Catalog of Research Libraries of The New York Public Library. According to the author's observations, the dictionary catalogs were not seen used at all by the patrons.

Dictionary Catalog of the NYPL
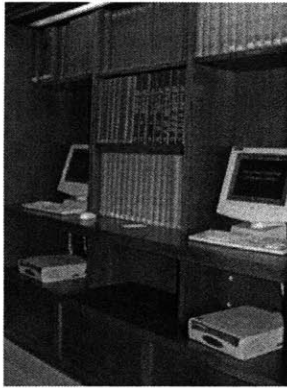
The present catalog room of the NYPL- The Dictionary Catalog of the NYPL and the computer workstations shelved together
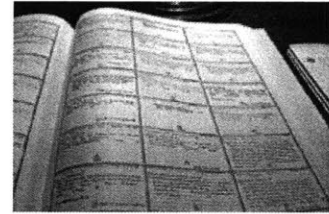
To locate books and other material, users access the NYPL electronic catalog through the public computer workstations. There are librarians stationed at the main reference desk in the catalog room to help in the use of the catalog, to suggest approaches to specific research projects, to answer general questions and to direct readers to the resources of the main reading room. The materials available in the General Research Division (underground book stacks) of the library can be requested by filing a call slip in the catalog room. The call slips are then delivered to the main reading room through pneumatic tubes, which are then sorted and sent to the underground stacks. The requested books are delivered from the underground stacks through the dumbwaiters to the reading room pick up desk. Although the pneumatic pipes and dumbwaiters were refurbished during the restoration, the existing process of book delivery to the end user remains the same since the opening of the library.

Pneumatic tubes deliver call slips to the Main Reading Room where they are sorted and sent to all 8 levels of the underground stacks.

The NYPL central library premises have a Starbucks kiosk at its 5th Avenue entrance opened as part of the Bryant Park Restoration two years ago. It opens for service only in spring and summer seasons. According to one of the library officials, visitors are not allowed to bring their coffee inside the library. They are supposed to enjoy their coffee at the outdoor seating provided near the kiosk.

4.1 The Central Library of the Seattle Public Library (SPL) – the State-of-the Art in Library Space Design and Technology

4.1.1 Introduction

The new 362,987-square-foot Central Library of the SPL opened in May 23 2004, is a playground for first-time-ever applications in technology and spatial design in a library. The new library designed by the Office for Metropolitan Architecture headed by Rem Koolhaas is situated in Downtown Seattle. The new structure replaces two previous central libraries for Seattle on the same site– the Central Library Carnegie (1906, Classic Beaux-Arts Design) and then the Central Library (1960, modern international design), both of which proved spatially inefficient and insufficient with passage of time.

The construction of this library is a result of finding solutions to the inadequacies of the older structures and the goals of the 'Libraries for All' program of the SPL. The 'Libraries for All' bond approved by Seattle voters in 1998, called for the upgrade of SPL libraries with new facilities, technology and books. According to designer Judith Van, an architectural tour guide at the SPL, a meeting was held between the City Librarian Deborah Jacobs, architect Rem Koolhaas and Microsoft CEO, Bill Gates prior to the design and construction of the library to discuss the future of the book and the library. The outcome of the meeting stated that the future of the library was not going to be either 'only book' or 'only digital' but that both would co-exist. With this as the basic thought the library has been designed to provide all the current media technologies to its users with enough room to house an ever-expanding book collection (presently 750,000 volumes). The new library has space for 400 public computers as compared to 75 in the old Seattle Central Public Library and 48 at the NYPL.

Although, most of the library interiors and spatial design boast of inventive ideas, here are some innovations in design and planning that would be relevant to the study:

Compartmentalized Flexibility

To ensure that the expanding space requirements for different library functions do not encroach upon each other's space and the public space in the future, the library is organized into spatial compartments. Each compartment is dedicated to a specific function for 'tailored flexibility' and equipped for maximum dedicated performance. Tailored flexibility remains possible within each compartment, but without the threat of one section hindering the other.

Compartmentalized Flexibility New Central SPL   Source: A+D Jan 2005

Administrative Areas

Public Areas
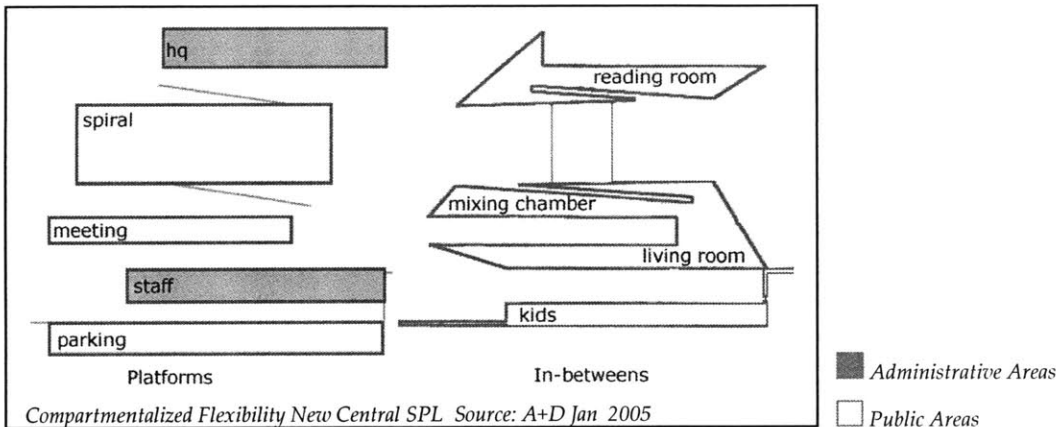
The library's five main compartments are – **administrative**, **books** (the Spiral), **meeting rooms**, **staff** and **parking** distributed across eleven floors. The open spaces between these compartments (**reading room**, **mixing chamber**, **living room** and **kids**) function as public spaces for **work**, **interaction** and **play** (SPL brochure, by Rem Koolhaas and Joshua Ramus). In the previous library building for the central SPL, activities conforming to different functional areas were scattered, mixed with each other across different floors encroaching upon each other's space.

Books Spiral:

Most of the non-fiction collection of the library is stacked on level six through nine with a spiral ramp connecting the floors and is accessible to the users. The ramp winds through the four floors at a gradual slope of 2 degrees. The books are serially arranged according to the Dewey Decimal system, starting from 000 to 999 from level six to nine. The concept of the book spiral is to allow the non-fiction collection to grow without having to move books to different areas or floors when one subject expands. The stacks can be easily rolled up or down. The spiral currently holds more than 750,000 books but can expand to more than 1.4 million. Reading tables with power and Ethernet ports and many public workstations are provided alongside book stacks on all floors of the spiral.

The stacks in the book spiral- the top shelf is kept empty for future additions. Dewey numbers on each shelf are marked on the rubber mats on the floor.
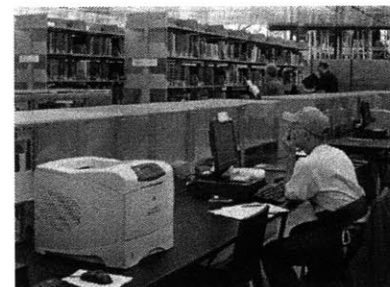
Mixed use of public workstations and books in the spiral

Mixing Chamber: This area of the library on level five directly above the Living Room and the entrance on the fifth avenue, is like 'a trading floor for information' mixing human and technological intelligence. Patrons come here with general questions or for help with in-depth research. Many librarians are available here roaming about freely through the Mixing Chamber. Unlike in other libraries, they are not tied to a service desk and are supposed to mingle with other staff and users. The Mixing Chamber is characterized by the intermingling of different information resources – the librarians, the reference books, 132 public computers for Internet access, 58 public computers for electronic databases, journals and electronic catalog access, 40 study carrels (wired and wi-fi enabled) and a relaxed seating area.
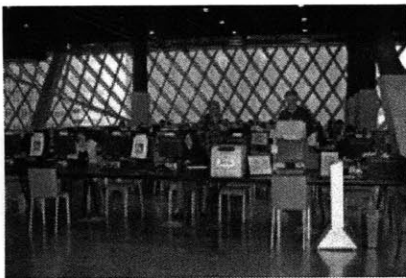
Public computers for Internet access

Public computers for catalog access

Living Room:

Situated on level three and accessible by the 5th avenue entrance, this area is the most socially vibrant and active space of the library. This is a space for users to **gather, meet each other** and **read**. The seating area of the Living Room is close to the fiction collection, periodicals, newspapers and video collections. A coffee cart and café are also located on this floor close to the library shop. Users are allowed to take covered coffee cups anywhere in the library but they have to sit at the café to eat snacks. The goings-on of the Living Room make it seem like a covered public park within a city (Figure on the next page).

A

Living Room

B

Magazine / Fiction Book Stacks

D

Café Inside the building

Library Entrance on 5th Avenue

E

Public Computers

Third Floor Plan (Living Room) – Seattle Central Public Library,
Plan Source: A+ D, Jan 2005
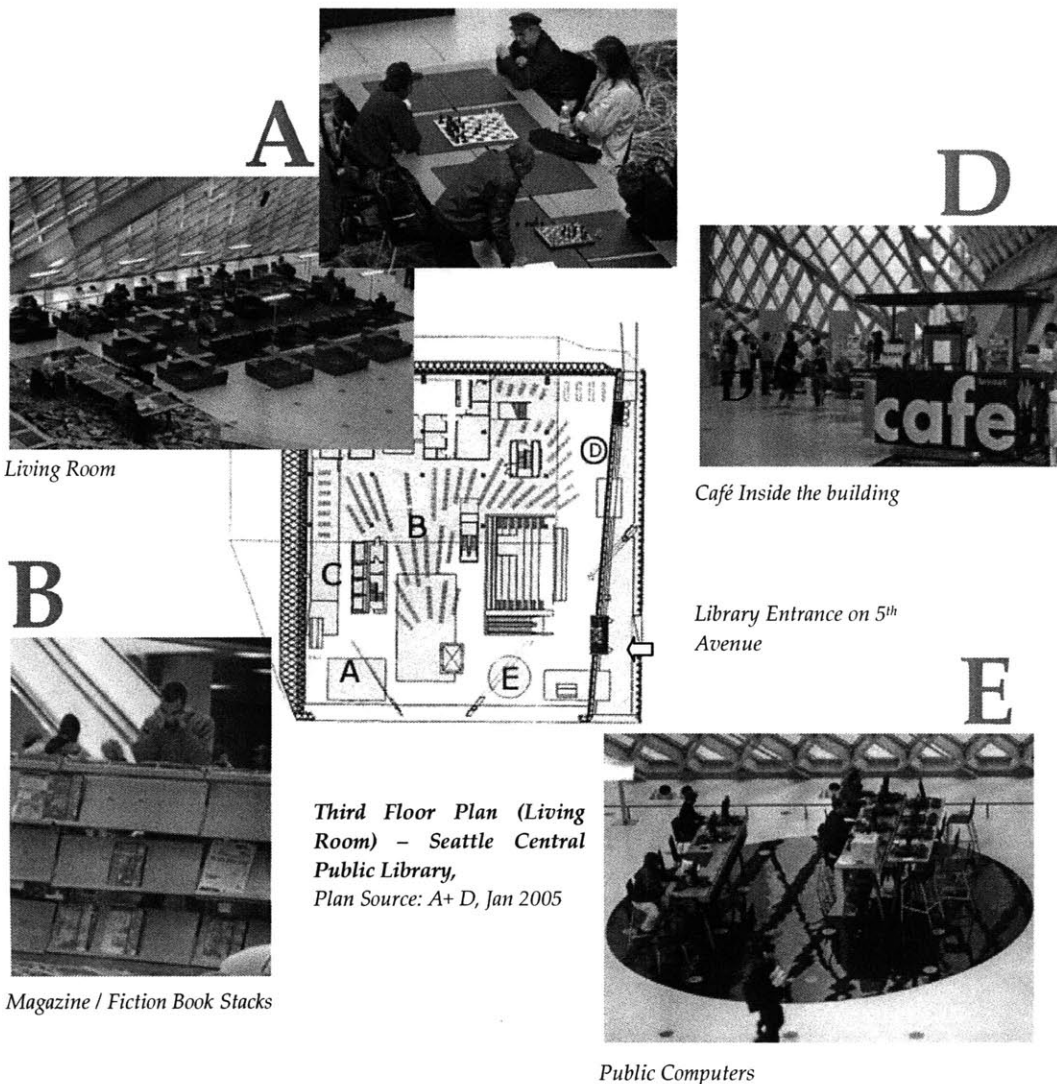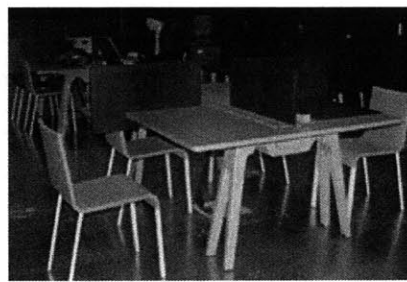
Furniture:

The library purchased plain, sawhorse-style reading tables instead of grand, expensive wooden tables to keep up with changing technology and materials. According to Deborah Jacobs, '*the*

*classical wooden furniture **loses out on adaptability** as wiring and space and ergonomic needs change and SPL wanted the furniture to be **flexible'** (Seattle Post-Intelligencer, 2004).*

The library also has soft comfortable seating for users to read or relax or both in the Living Room as well as in the reading room.

Color: Use of bright colors through out the library challenges the studious look of a stereotype library. The library interior space is intended to draw a new and younger crowd (Seattle Post- Intelligencer, 2004).
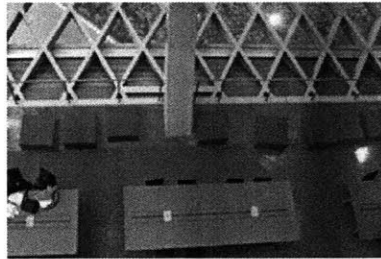
Red colored teen center in the Living Room-picture from above
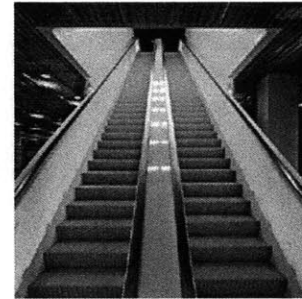
Chartreuse Elevators

Hi-tech Features

- Free wi-fi access through out the building
- About 400 computers for public use, nearly six times as many as the old building. Out of these 132 are dedicated for Internet use in the Mixing Chamber. The rest include computers for electronic databases and journals access, word processing, image editing & multi-media

Wi-fi makes information omnipresent- Café manager also busy online between serving coffee

- The teen center has 12 computers reserved for students in grades 6-12, loaded with PowerPoint and other software helpful for their homework
- Automatic check out machines, combined with RFID (radio frequency id) chips that allow users to check out an entire stack of books at a time and self – serve. Combined with the use of conveyor belts, RFID technology is also useful in automating and simplifying the book sorting process.
- An online catalog that provides photos of requested items. This feature is similar to the item description listed on www.amazon.com. The online catalog also illustrates the physical location of the requested item.

Self serve check out

- All librarians through out the building are connected through 'vocera'; vocera is a wireless device previously used in hospitals and is being used for the first time ever in libraries. This technology helps in delivering answers to patrons' questions on the spot and getting interdisciplinary help from librarians (Seattle Post-Intelligencer, 2004).

SPL online catalog

4.2 A Comparative Analysis

Below is a comparative analysis of the two public libraries' spatial and functional characteristics.

New York Central Public Library	Seattle Central Public Library
Classical Architectural Design	Contemporary Architectural Design
Non-circulating research library- no check-in / checkout of books. The reading room has a book delivery and pick-up counter for books to be read in the library	**Circulating public library** - check-in /check out services, self check-out and book drop available
Common public space for many library functions on one floor – catalog access, librarian assistance, computers for Internet and electronic database access, copying and printing, reading tables, laptop docking, open – shelf reference collection, book delivery and pick – up. **It raises the question of whether there is room for future expansion?**	**Compartmentalized Flexibility** – library administrative functions separate from public spaces. **Vertical division** of functional spaces. **Room for expansion** of individual functional spaces without encroaching upon other spaces
Total number of public computers=48	Total number of public computers=400
No wi-fi	Wi-fi available in all parts of the library
No place to meet, interact & relax – library space meant primarily for reading and working	The **Living Room** meant for meeting, interacting, relaxing, reading & working
Classical **expensive wooden furniture retrofitted** with electrical & Ethernet ports and computer workstations.	Plain, **inexpensive furniture** purchased for **flexibility** in the future. Comfortable soft seats available for relaxing and reading
Most part of the non-fiction books collection in underground **non-brows able stacks**	All book stacks arranged in a Spiral, intended for **convenient and enjoyable user browsing**
Use of **soft monotone color** through out the library – renders a serious, academic look and feel to the library	Dramatic use of **bright colors** to create a lively and fun public space
No food, drink or using cell phones allowed inside the library	**Coffee cups 'with a lid' and using cell phones allowed** anywhere in the library
Coffee shop outside the library building – forced to close in winter months	**Coffee shop inside** the library building – open through out the year

5. Field Observations at the Public Libraries

This chapter discusses the author's experiences and participant observations in the field. As a corollary, it will be examined whether the **nature of space** and **available technology** determine the **library's culture** and **user behavior** and if so how. It will also discuss the different trends and issues in public library use today.

The fieldwork included participant observations, informal interviews, personal experiences and numerous photographs at the two public library case studies. The author spent time at each library for three working days (coded as day 1, day 2, day 3), observing users, the goings- on of the library and talking to users (wherever possible) and librarians. Photographs of the library's interiors were taken to understand its spatial elements and user activities. Due to patron privacy policies of libraries, it was difficult to take clear pictures of natural activities hence the quality of some of the images may be compromised.

5.0 Observations and Inference at the NYPL

Days of observation: Thursday March 10, Friday March 11, Saturday March12, 2005
The library opens from 10 am to 6 pm Monday to Saturday and 1pm to 6 pm on Sundays. According to one of the librarians, the library started opening on Sundays due to excessive patron demand. Detailed observations at the NYPL are documented below:

1. Patrons and Library Use
To understand who the users were and what they were doing in the library, see Table 2 and 3 in Appendix A. There was more number of users engaged in reading, writing and working independently without referring to the library's research books collection.

The reading room at 10 am

2. First Impressions – Too Many Restrictions
On day 1, I visited the library to get a preliminary idea of the space, talk to the librarians for information on library services and to inform them about my study. When I reached the library at 11am on day 1, all visitors' bags were checked at the entrance. This ritual was followed every time a person entered and exited the library. The serious atmosphere of all 'work and no-play' in the huge reading room with many study lamps forced me to sit quietly at a table to observe the grand space. Tourists were continuously trickling into the reading room, most of them clicking pictures of the intricately adorned ceiling. They limited their footsteps to the fringes of the reading room, careful not to disturb the patrons working at the desks.

I saw signs prohibiting use of cell phones and eating or drinking inside the reading room and catalog room of the library. In spite of the restrictions, I saw many people drinking water and juice and eating snacks on the sly. Many users were seen talking on their cell phones for short periods of time in hushed tones in the reading room.

An empty wrapper of a candy bar consumed on the sly by a patron

3. Issues of Internet Connectivity

On seeing many users with laptops in the reading room on the first day, I was curious to find out if the library was wi-fi enabled. On asking a library staff member about it she immediately replied, ' To access wi-fi you have to go to Bryant Park behind the library'. It came across as if Bryant Park and its free wi-fi were considered part of the NYPL and its services. I wanted to know more about why the Central Library was not yet equipped with free wi-fi when the Mid-Manhattan library which is located diagonally across the Central Library and 57 other NYPL branch libraries had free wi-fi for their users. On enquiring with a librarian 'stationed' at the catalog room, I was told that the project to enable the central library with wi-fi was underway but the bureaucratic procedures were taking long. He also mentioned that the librarians get at least 10 email and phone queries daily from prospective users enquiring if the library had free wi-fi. The librarians automatically directed them to the free wi-fi service available in Bryant Park.
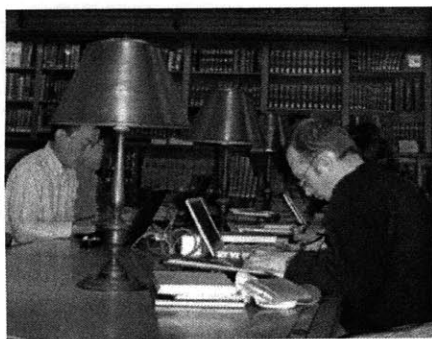
The main reading room is divided into two sections by the book delivery and return desks - one side of the room has public computers for accessing library's electronic resources and the Internet and desks for laptop 'docking' (accessing library's Ethernet), the other side is non-Ethernet and non- public computer zone with tables having only power ports for laptop use or charging other mobile devices and reading books. The availability of Ethernet and absence of wi-fi meant that Internet users of this reading room have to come prepared with a personal Ethernet cable. In the absence of wi-fi, spontaneity of online access is missing in the library.

4. The Need for Solitude from the 'Sounds of Digitization' – the Clacking of the Keyboard

Both sides of the reading room had 6 end desks (12 desks out of a total of 40 desks in the reading room) marked 'no laptop use', in other words 'quiet tables' free of typing noise. There were 'at

Quiet Tables

least' 7 people studying at 6 of these quiet tables at any point of my observation during the day.

5. The Fear of Being Watched

Two guards patrolled down the main aisle of the reading room once in every 15 – 20 minutes to monitor the use of the room. I saw one of the guards ordering User 2 (See Table 2, Appendix A) to keep her water bottle inside her bag. One of them went up to User 14 (See Table 2, Appendix A) to wake her up while she was sleeping with her head down on the desk next to her partner working on the laptop. She immediately got up and opened a book in front of her. In another incident, a security guard asked a lady who was sitting down on a step in the reading room to get up. She got up to sit at one of the reading desks. On one of the observation days, the guard tapped User 18 (See Table 2, Appendix A) thrice to get up from his sleep. Everytime the user would wake up to stare at the newspaper in front of him for 2 minutes and then would go back to sleep.

At lunchtime, I saw a young guy and a young lady talking on their cell phones covering their mouths with their hands in the reading room. They were talking in hushed tones either to avoid disturbing others or to hide the cell phone from the security guards. Despite his efforts to hide the phone, the guy was spotted by one of the guards and was subsequently asked to switch it off. Contrary to this, whenever I stepped out there were at least three people freely using cell phones in the lobby outside the reading room. Using cell phones was officially allowed in the lobby.

6. The NYPL library - A Place for Individual Work with Co-present Others

Apart from the couples mentioned in Table 2 and 3 in Appendix A, I saw another teenage couple and a group of three boys known to each other in the crowded library. The teenage couple was sitting together on one of the 'quiet tables' in the Ethernet room, but they were reading independently. They talked to each other from time to time and at one point the girl put her head down on the table and the boy had his arm around her. There was a group of three boys (20- 25 years old) sitting in a row in the Ethernet side of the reading room, each working independently with his laptop and two of them with headphones on. They were talking to each other intermittently and one of them pointed to something on his laptop to the other two. According to my observations, only two couples (couple B and D, see Appendix A) were working collaboratively (one user showing the laptop contents to the other). The other couples, although they sat next to each other, were not working together- the men were working with their

A couple that came in together in the reading room – but working independently

One of the few groups working together

laptops but the women accompanying them were either reading or sleeping.

It seemed that the formal seating arrangement (rows of long reading tables with rows of chairs next to each other) did not allow any flexibility in the seating configuration and the Ethernet made users with laptops immobile within the reading room. This clubbed with the security surveillance discouraged teamwork, collaboration and interaction amongst users.

7. Strangers in the Crowd

The verbal interaction amongst people in this library was limited to users who already knew each other like the couples mentioned above and between users and library staff at the information desks and librarians in the catalog room.

Interaction between library staff behind the desk and users

The studious and quiet atmosphere and the 'fear of being watched' in the reading room even made me conscious of observing the goings-on of the room and forced me to continuously write notes in the hope of being seen busy through out my time spent in the library. In another incident in the reading room, I requested a user who had been sitting next to me for almost an hour to keep an eye on my charging cell phone while I stepped out for 10 minutes. The user simply shrugged and refused to do it suggesting that he was not responsible for looking after my belongings.

Group of users chatting - known to each other as they came in together to use public computers for accessing Internet

In this kind of an environment that did not encourage casual conversation amongst users to bring about an air of friendliness, it became difficult for me to talk to any user for the purpose of the study. As we will see in the next chapter, talking to users at the Seattle Public Library was more natural and spontaneous.

8. Library as a Workplace, Virtual Meeting Place and a Shelter for Some

The following observations reveal that the reading room of the NYPL was not only being used for books but was also being used as a work place and a day shelter:

When I reached the library at five minutes to ten in the morning on day 2, the main door was still shut and there were 15 people waiting outside with either handbags or laptops. These people seemed regular users of the library and not tourists as they came in and sat at the reading tables without wandering about, opening their notes or laptops. Some of them used the workstations in the catalog room.

On day 3, I observed that User 24 with a webcam (See Table 3, Appendix A) and two other users with laptops were present in the same part of the reading room on the previous day as well. I noticed that two other elderly users sitting with piles of books were also present on the previous day. These five users as well as many others with laptops (including Couple A, see Table 2, Appendix A) came in at different times in the morning but sat working till the library closed in the evening. I saw them stepping out of the library for a short interval only in the afternoon, most probably for lunch.

I observed that at least 10 cell phones including mine were left to charge on the desks. As I tried to peek into the screens of different users with laptops, I observed that most of them were surfing on the Internet, some were instant messaging, some were Googling and many were writing emails. As mentioned before, some users also chose to be connected on the sly through their cell phones. Even though the library did not allow interaction between co-present users, it let them virtually communicate with others.
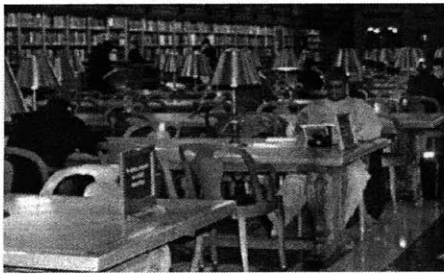
The non-Ethernet side of the reading room – close to empty by 5.40 pm

Ethernet side of the Reading Room - Users continue to work till 6 pm, closing time of the library

On both days of my observation, I noted that as the library prepared to shut down at 15 minutes before closing time at 6 pm (a loud announcement was made by a librarian for the users to start winding up), users without laptops started leaving the library returning the borrowed books on their way out while the users with laptops accessing the Ethernet continued to sit till 6 pm.

User 4 and User 18 spent time in the reading room through the open hours of the library from morning to evening on two days of my observation. They were both wearing unclean clothes, appeared unkempt and did not have any possessions like handbags, notebooks, paper, pen or pencil. It appeared to me that User 4 pretended to be immersed in reading tomes of library books while User 18 pretended to read the newspaper from time to time between his sleep to keep the security guards at bay. This led me to believe that these two users were homeless people using the library as their day shelter.

9. The Book Pick- up and Return Ritual – A Waste of Time?

I spent some time watching the book delivery section of the reading room while sitting on the bench along with other patrons waiting for their books. Patrons give their call slips with call numbers at the catalog room and are given waiting numbers. These numbers are displayed on the electronic board at the book pick up desk when dumbwaiters deliver books from underground stacks. Photo-ids are required from all to use the books from underground stacks. There is an average wait of 30 minutes to get the requested books and most patrons preferred to sit in this side of the reading room after getting their books. There were many patrons coming from the other side of the room to return books. I saw two patrons using their PDAs while waiting for their books to be delivered while many others sat reading. Others were sitting and watching people around them. In this day and age when time is very precious, this ritual seems very time consuming.
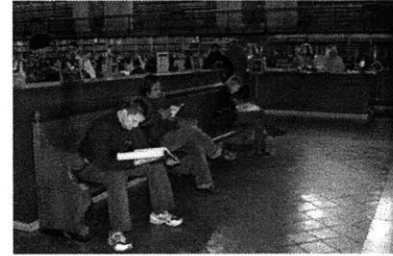
Waiting for books from underground stacks
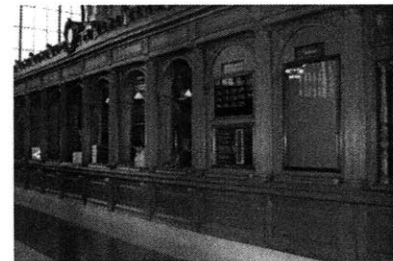
Book delivery and return desk – electronic display showing waiting numbers

9. Library Used as an Internet Café (.... without the coffee)

As I was observing the path of users from the book delivery desk to the reading tables, I noticed that none of the users with laptops and users working at the public computers was borrowing library books. In my time of observation of the Ethernet side of the reading room, only one girl borrowed library books while working on her laptop connected to the Internet.

On talking to a librarian, I found that most of the electronic resources of the NYPL could only be accessed through the library public computers. So it was most likely that the users connected to the Internet in the reading room were not using library's electronic resources. It can be inferred from this that most people using their personal laptops to connect to the Internet in the reading room were not using library's information resources.

As can be seen from Table 4, Appendix A and the Figures A & B, the public computers for

Fig. A, Public computers for electronic resources access
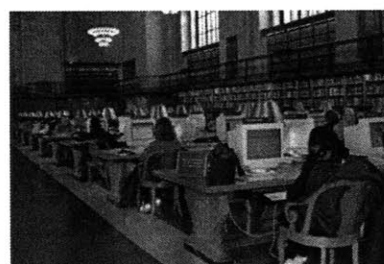
Fig. B, Public computers for Internet access

accessing the Internet (available for a maximum time limit of ½ hour per day per person with a valid photo identification) were used heavily. Table 4 also shows that the number of Internet users was more than the users for accessing library's electronic resources at all points in time of the observations. I dedicated some time of my observation only to the use of the public computers. I found that all users at these terminals were visiting the reading room only for accessing the Internet. They would come to the reading room from outside (not from any other part of the reading room) and on finishing using the public computer they would leave the room, except User 18 who was in the reading room through out the day. As I observed them, I saw six people surfing in pairs - an old couple (each 60 – 70 years old), a pair of kids (each 10 – 12 years old) and a pair of mother (35 – 40 years old) and daughter (5 - 7 years old) and many surfing independently but having come to the library in groups. It can be inferred from this that the public computers for Internet access at NYPL were being used as an Internet café, where users came alone, in pairs and in groups, only with the purpose of online surfing.

10. The Open-Shelf Reference Collection and Dictionary Lecterns – Old-Fashioned and only to be Admired?

The reading room has an open-shelf reference collection (25,000 volumes) all along the room's four edges. This collection has some of the most comprehensive encyclopedias, biographies and indexes. I saw only 5 people (out of which four were men, approximately in the age group of 50 – 60 years old and User 4) referring to the collection on day 2.
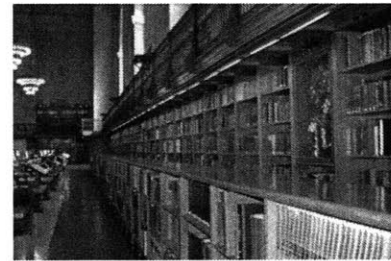
Open-shelf reference accessible to users but underused

The only spot that I saw tourists posing for pictures with themselves in it in the reading room was the dictionary lecterns that were as old as the library. I saw the dictionaries being used only twice on day 2 - by a middle-aged lady between 40 to 50 years old and by a pair of teenage girls who were taking down notes from it.

Considering that the reading room was crowded as can be seen in the photographs and only a few people referred to the reference collection and the dictionaries, it would be appropriate to say that these library resources were underused.

Dictionary lectern

5.1 Observations and Inference at the Seattle Central Public Library

Days of observation: Saturday March 19, Sunday March 20 and Monday March 21, 2005.The library opens from 10 am to 8 pm Monday to Wednesday and 10 am to 6 pm on Thursday to Saturday and 1pm to 5 pm on Sundays. Detailed observations at the SPL are documented below.

1. The Living Room – Central Park with a Roof
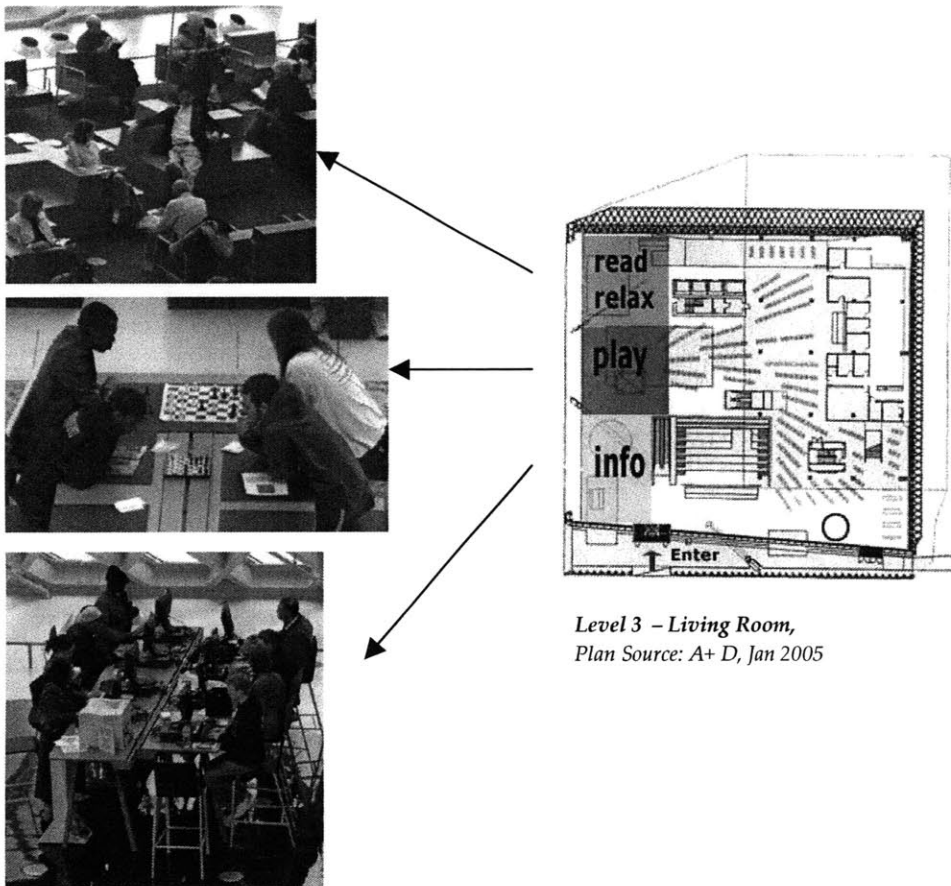
Level 3 – Living Room,
Plan Source: A+ D, Jan 2005

At first glance the living room at the library's 5th Ave entrance seemed like a covered park or a shopping mall with books. There were people buzzing about between the living room, the coffee shop, book stacks and the escalator. Many visitors of the new library were observing the Living Room from the higher level of the Mixing Chamber. Visitors and tourists were freely moving around amongst the seated users without any fear of disturbing them. My observation revealed that this level of the library encouraged a variety of activities and interaction amongst people, unlike at the NYPL where I saw users only working or reading. People of all ages from children to the elderly were seen at the SPL. Some users were reading quietly while others were simply staring into space or chatting with each other. One's activity did not seem to disturb the other. Yet the level of sound was controlled to a constant murmur.

The living room consisted of three zones - **the play zone, the living room zone** and **the information access zone**. In the play zone, most of the users were regular library users playing chess, video games and card games. There was always at least one pair of men playing chess and at one point in time there were five pairs playing the game with many others looking over. Many of the players would sit playing from morning to evening till the library closed for the day. One of the users in this zone (see User 5, Table 1 & 2, Appendix B) would be in the living room from morning to evening playing video games on his laptop. The information zone had a front desk as well as public computers for the Internet and the SPL electronic catalog access.

No fear of being watched – people sleeping, talking and using the living room as a waiting lounge

In the living room area, users were sleeping, chatting, reading, and drinking refreshments, waiting or doing nothing. I saw two men rolling a cigarette in this space but one of them stepped out to smoke. Users of this space did not experience the 'fear of being watched' except in the case when they fell asleep. A female security guard would come by to wake up all those who would doze off but they would go back to sleep as soon as she left. Unlike at the NYPL, users wanting to sleep or do nothing while at the SPL did not pretend to be occupied with a superficial task. The informal seating arrangement (as compared to the rigid arrangement at NYPL) and the freedom to use the space almost like any other public space today in the USA, made it very vibrant.

'No sleeping'- One of the few prohibitions in the library –. A security guard waking up sleepy users

2. Informal Space == Friendly Face?

Unlike at the NYPL, it appeared that strangers were friendlier to each other here. After having spent almost the whole day at the SPL, I met a person in the Living Room (User 4, Table 1 & 2, Appendix B) whom I had seen at the lower level in the morning. Without any prompting from me he started a conversation by commenting that I had been in the library for the whole day. He told me that he came to the library everyday – to access the Internet through the public computers, SMS his girlfriends found online, read the newspaper and to simply hangout. He loved the library space for its peace and quiet, friendly people and its futuristic look. The only thing he did not like was the one-hour time limit on daily use of the public computers. He would have liked to spend more time online in the library.

User 4 using the library as a hang out space

In another incident, I requested a young man sitting next to me on the four-seater soft chairs in the Living Room to look after my umbrella while I went up to take a picture. He readily and smilingly agreed to do it.

At one point there was a man in the living room talking to himself and no one in particular. I sat opposite to him putting my head down to rest for a while. He warned me to not to sleep, as the guard would come by to wake me up.

User 4 busy SMSing

I rarely found anyone glaring at me or myself being self-conscious while I took photographs. In fact, one girl in the reading room was very curious to know why I was taking so many photographs and asked me about it in a very friendly way. In contrast to this, it was difficult for me to take photographs of the reading room at the NYPL without getting stares from users.

These experiences make me believe that the informal and friendly atmosphere in the library was brought about by the spatial characteristics - open spaces, no closed carrels, variety of informal seating arrangements, bright colors and the library policy to allow users to bring in beverages.

3. The Library – a 'Virtual' Hangout and an Internet Cafe for Many

The new SPL library has a total of 400 public computers (as compared to 48 at the NYPL). Out of the 400 computers, 132 are available at the Mixing Chamber for Internet access and the rest are equipped for electronic catalog & database access, Word Processing and Image Editing, interspersed in the Living Room and the Book Spiral.

As can be seen in the photographs below, the Internet access terminals were heavily occupied through out the open hours of the library. Each computer could be used for a maximum time of

an hour. Unlike at the NYPL, users do not need to show any photo identification to use the public computers. These computers are part of the Mixing Chamber, where subject-specific librarians are available for reference and help. The computers for Internet access were much more in demand than the computers for the library's electronic resources and catalog access.

10 AM Computers for Internet access   2 PM   6 PM
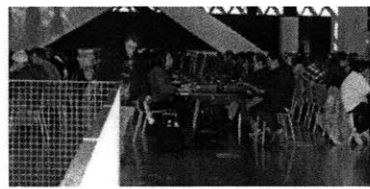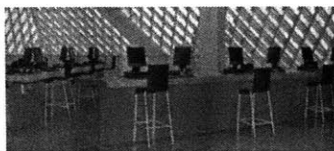
10 AM Computers for electronic resources   2 PM   6 PM
/catalog access

I interviewed one of the 'technology-expert' librarians about the use of the Internet access terminals. According to him, about 100 guest passes are given out daily (and plus there were regular library members). The average time of usage of a computer was about half an hour, the average number of users was 200 per hour and total number of users was approximately 1600 per day. The 24 public computers for Internet access at the NYPL were also continuously used with very few unoccupied at any point. This goes to show, that there is an ever-increasing demand for the free use of the Internet in public libraries in the USA today. The greater the number of public computers for Internet access provided, the higher the number of people who will be using them.

The librarian informed me about another interesting facet of the Internet use. He said that most users of the Internet access terminals visited the library solely for the purpose of online surfing. They did not avail of any other library services like borrowing books or sitting at the Living Room except may be buying a cup of coffee from the library coffee shop. The library received users with a range of computer experience levels – 'from computer illiterate to high bandwidth Ethernet and wi-fi users.' With the increase in number of computer illiterate users, the demand for technical assistance from librarians also increased. This demand brought about the establishment of a new job profile at the SPL – that of the 'Public Service Technology Assistant'.

4. Library Space as a Workplace, Entertainment Center and a Shelter for Some

I saw many regular users of the reading room who would be in the library from morning to evening on two days of my observation. Two reading room users (User 9 and User 10, See Table 1 &2, Appendix B) worked on their laptops, were online most of the time and received calls on

their cell phones once in a while. They were both in the reading room on all three days but changed their seat everyday. There were a few more users whom I saw working in the reading room for long hours. I did not see any of them using library books or magazines.

There was free use of cell phones in all areas of the library. I did not see any signs prohibiting the use of cell phones or laptops in any part of the library. The loud rings of cell phones and people talking on the phones did not seem to unnerve other users. The presence of regular users working for long hours with their laptops using library's wi-fi and the constant loud ringing of cell phones converted the reading room into a workplace setting.

Many other observations also point to similar library use. A couple (the man about 40-50 years old and an accompanying lady about 50-60 years old) sitting behind me in the reading room were filing tax returns. The man appeared to be a tax agent who was helping the lady fill out her tax forms. They were not using a laptop or a library book. They worked on the taxes through out their time spent in the reading room. I also observed free tax-filing assistance for senior citizens in the Mixing Chamber on Saturday. There was a long line for this service with many people waiting their turn.

One of the users (see User 5, Table 1 & 2, Appendix B) would play video games on his laptop from morning to evening in the Living Room. On one of the days he had company, with both of them sitting next to each other but playing independently on different laptops. The fact that they sat there playing for the length of the day points to the fact that it was either their livelihood or their daily occupation for which they used the library as their workplace. The knowledge of whether they were playing online using the library's wi-fi would have added another layer to the activity's analysis.

User 5 (right) playing video games

According to my observations, the library premises were increasingly being used as an entertainment center. As mentioned before there were users involved in playing and observing chess, playing cards, sitting and listening to music with their earphones etc. I also saw User 11(See Table 1 & 2 in Appendix B) with a portable DVD player and DVDs on all days of my observation in different areas of the reading room. He could have been watching movies borrowed from the library.

User 11 - Regular user who watched movies on his DVD player

As seen at the NYPL reading room, there were many people who seemed to be using the living room as their shelter for the day. These people were not reading or playing. They would sleep from time to time on the comfortable chairs of the living room. They had big stuffed bags that they carried in and out of the library.

User with laptop and joystick – most likely playing video games

5. The Reading Room - Another Living Room

The reading room at the SPL is in stark contrast to the NYPL reading room. It has different types of seating available – reading tables for four, reading tables for twelve and many comfortable living room - like chairs. The atmosphere here was more casual with mixed use of books, laptops, beverages, cell phones and chatting amongst users. Users drank water or other beverages very openly and many people were chatting with each other while sitting here.

The tables are provided with power and Ethernet ports for laptops and other mobile devices along with free wi-fi in the room. The laptop users can be seen working at the reading tables while the book readers are comfortably seated on the living room - like chairs. Although the tables were designed such that groups of users could sit together, most strangers sat independently on different tables. More couples were seen working together at the SPL than at the NYPL.

Reading Room at SPL
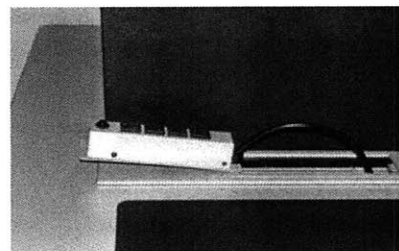
Detail of the reading desk - power ports for mobile devices

Most readers sat on comfortable chairs.

Users chat more freely

Large consumption of coffee & and other beverages in the reading room

Cozy couples working together

The SPL Reading Room

Notes on the Observations at the Public Libraries

NYPL has retrofitted new technologies into its old, classical building to keep up with the technological demands of the time. It can be inferred that at the NYPL there has been no innovation in design of the nature of space for bringing about a more enjoyable user experience for conventional library functions (for example, librarian assistance, browsing books etc.) or to create situations for unconventional use of the library's public space. For this reason not many improvisations in space use were found at the NYPL. On the other hand, it was observed that design innovation at the new SPL has created vibrant and new uses of space, enjoyable user experience with more efficient information search process and a relaxing environment for users. Irrespective of the architectural differences in the two libraries, it was observed that both libraries were used extensively and they are successful in terms of their usage statistics (1,346,991 annual users at the NYPL and 8000 visitors / day at the new SPL in its first year of operation). This observation will be kept open for further analysis and study.

6. Field Observations at the MIT Libraries

A Note on the MIT Libraries Annual Report

According to the MIT Libraries Public Services' Annual Report for 2003-2004 - "The reliance by faculty, students, and staff (of MIT) on library services and resources remains strong with significant growth in some areas and anticipated declines in others due to improvements that enable user self-sufficiency."

Various MIT libraries (including the case studies) enjoyed a strong circulation and occupancy in the year 2003-2004 with an appreciable increase from the past year. The MIT Libraries' report also states that the growth in demand for e-resources and other online services continues along with the high demand for librarian reference services. It also states a 161 percent growth in the libraries' instructional program in the last five years. These statistics prove a healthy and vibrant use of all library resources. My fieldwork records various existing and emerging patterns of use of two MIT library spaces and a survey from a group of community members that reveals user preferences, library performance and the role of the library in their academic lives.

6.0 Observations and Inference at the Stata MIT Libraries Information Intersection

Introduction

The MIT Libraries Information Intersection, opened in May 2004, is a 13′ x 13′ free standing room on level 2 of the Stata Center at MIT. Below is a photographic description of the space.

A *MIT Libraries Information Intersection*
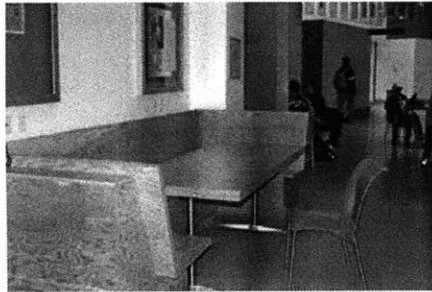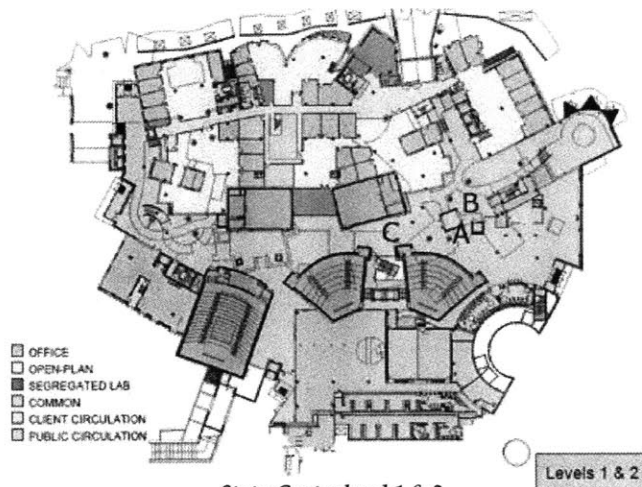
Stata Center level 1 & 2
Source: Stata center website

B *The café spill out*
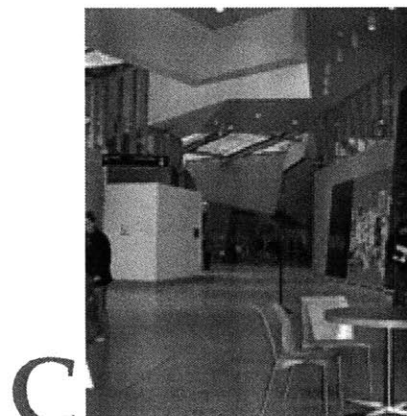
C

Student Street

The MIT Libraries website (http://libraries.mit.edu/stata) describes the space as:

- *A point of outreach for the MIT Libraries*
- *A collaborative space to further educational, research and community goals*
- *Quick network access on the Stata Center Community Street*

This space is provided for members of the MIT community to study, conduct small meetings, connect to the network, and make use of available library resources (handouts, online databases etc.).

The library guidelines state that the library will be used on 'first come, first served' basis and that users are expected to show courtesy to others by refraining from using the space for extended periods of time. The computers provided on the outside are for quick access to the MIT network and hence meant to be used for short periods of time.

The library receives a mixture of users– undergraduate students, graduate students, visitors and anyone else who happens to pass by the student street.

The author spent approximately twenty-one hours (including 10 am to 6 pm on Wednesday, March 2, 2005) spread across different days of the week and times of the day observing the use of the space, conducting participant observations and hourly user-space mapping and interviewing users when possible. Detailed observations at the MIT Libraries Information Intersection are documented below.

1. A 13' X 13' Room – An Unconventional Research University Library

The room has six public computer terminals (3 Win. mit.edu and 3 Athena, with 20 minutes time limit for each) on the outside wall and a seating space for 8 people inside. The space lies next to a cafe on the 'Student Street' of the Stata Center (a reflection of MIT's infinite corridor) thus surrounded by a lot of activity with people eating, drinking, meeting and working at the café spill out. There is free access to wi-fi in all parts of the building (as it is in most of the MIT campus) including the Information Intersection. The room provides four power ports and four Ethernet ports alongside free wi-fi. A black board and projector are

available for community use. There are no stacks for journals, monographs and other documents and no librarians available in this space. A small community books' shelf, a book-drop facility, online access to databases and librarians (through the MIT Libraries website) are available for community use in this library space. Users can make use of the sliding doors to conduct meetings, presentations etc. In short, it is a flexible open space provided by MIT Libraries for community use.
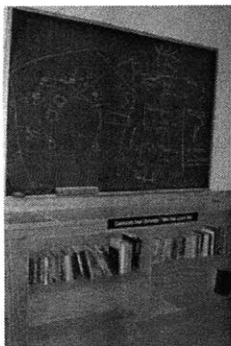
Books & a black board for community use
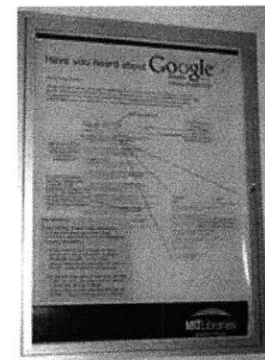
Librarians replaced by 'How to use Google Scholar' poster in the space

The unique nature of the library space becomes a point of interest for first time visitors to the Stata Center. The space generates curiosity amongst users passing by it making them walk through it rather than by it.

When I studied the space I realized that it is successful both in providing visibility for MIT Libraries and attracting users. The MIT Libraries user data and my observations suggest that

the six public computers are used heavily (more than 13000 user logins since it opened) and the seating space invites users frequently during any working day but less frequently during the weekends. The peak usage of the computers was observed to be in the afternoon reducing gradually towards nighttime. At its peak usage time, all computers were continuously occupied with people waiting their turn.

Library terminals always busy during lunch hours

The most popular activities carried out in the Information Intersection were unconventional of a research library. Students and others used it as a quick access point for checking email and a space for group work and individual work with or without laptops. Few people would stroll in to browse the community bookshelf or drop books off in the book drop provided (See Table A, Appendix C). Most users of the library computers were seen checking email except one user who visited www.google.com and a few others who checked the MIT location map. None of the users was seen logging on to the MIT Libraries website.

The library computers were also used as a location tool. Three users who were probably new to the MIT campus used these terminals to check specific campus locations by opening the online MIT campus map.

A library space is conventionally characterized by peace and quiet, but this space is surrounded by noise and activity. In spite of the din, the space attracts many users, which suggests that they like co-present others and background noise while working. Unlike most other libraries, it allows open consumption of food and drink. Most people who used this library facility were connected to other people by cell phones, online chat and email or just by the virtue of being in a group.
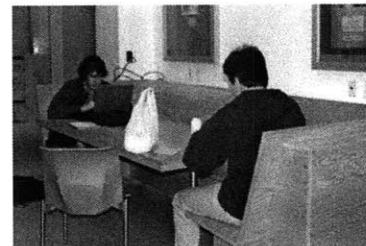
Food consumption in the library space

An interesting observation was noted in the use of the sliding doors of the library. I saw the doors being used only thrice – twice by two individuals on two different occasions and once by a group. None of the two individuals closed both sides of the doors to completely isolate themselves from the crowd. One of them closed only one side of doors, while the other partially closed both sides of the doors. The group of students was working with the doors closed. This observation suggests that individual users of the space did not like to work in complete isolation from others.
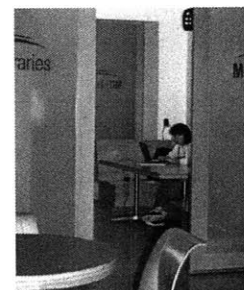
Sliding doors left ajar by an individual working inside

2. A Space for Multi-tasking

As can be seen from the Table 1 in Appendix C, most users working in this space carried out multiple tasks at the same time – like working on a software application while chatting online on a laptop, or working on a laptop while talking on the cell phone or listening to music, or talking to a friend while working etc. This suggests the growing trend for multi-tasking in student spaces that provide the appropriate infrastructure.

3. Nature of the Space Invited Serious Workers

The partially enclosed space visible to all passers by was conveniently located and easily accessible from the Student Street. Interestingly, it mainly attracted people who wanted to work on their laptops, assignments and projects and do group work or simply read and write. Very few people were seen only relaxing, eating, drinking and doing nothing in this space.

4. 'Meet a Friend' Library

Although, the space mainly invited people who wanted to work, it also facilitated chance encounters as can be seen in Table 1, Appendix C. Many encounters began with greetings ending in long conversations.

A meeting of friends

5. MIT Information Intersection: A 'Complete' Network Point

According to my observations the small library facility provided network connectivity to all users – with or without laptops and other electronic mobile devices. The public computers provided quick Internet and Athena access to users passing by while individuals with laptops could sit inside the space and use the free wi-fi.

These observations suggest that the design goals of the library space have been achieved to a large extent. The space is successful in terms of the MIT Libraries' outreach program to the MIT community; it is used as a point for connecting to the network but limited to email communication and is popularly used for individual and group work. The only goal that does not seem to have been achieved is the use of the facility for accessing MIT library resources (online catalog, online databases, reference librarians etc.). The library facility acts as a convenient study space for individuals and groups at the MIT community.

6.1 Observations and Inference at the Dewey Library (Management and Social Sciences Library) at MIT

Introduction

The Dewey Library, opened in 1964, is located at the eastern end of the MIT campus. It serves the MIT Sloan School of Management and Social Sciences, MIT Department of Economics and MIT Department of Political Science. The public areas of the library are distributed on level 1, level 2 and a small part in the basement. Level 1 consists of closed carrels, group reading desks, soft seating, librarian reference desk, circulation desk, library computer terminals to access databases, Athena and the Internet, reference stacks for monographs and old editions of technical journals, administrative offices and restrooms. Level 2 consists of monograph stacks, closed carrels, group reading desks, four library computer terminals, group study rooms, an Athena cluster and restrooms. Additional holdings of the library are located in the basement. The library also provides free wi-fi service to its patrons like other MIT libraries. Sloan School graduate students form the core user group of the library as is evident from the age group of users in Appendix D. According to one of the librarians at Dewey, none of the professors at MIT visited the Dewey library barring a couple of them.

The author spent two working days (Wednesday, March 30 2005 and Thursday, March 31 2005) conducting hourly user- space mapping of the library space (level 1), participant observations, interviewing librarians and users when possible and taking photographs. Peak time of usage of level 1 was observed between 12 pm and 5 pm and of level 2, between 1 pm and late evenings. Detailed observations at the Dewey Library are documented below.

The front desk and Athena terminals

Library Athena terminals

Side of the reading room with rows of carrels next to book stacks

Side of the reading room with two rows of carrels

1. The Dewey Management & Social Sciences Library or the Dewey Quiet Cafe?

According to one of the librarians at the Dewey Library, the library management 'officially' started allowing students to bring in food and drinks (as long as it did not smell) in 1998. This was done in response to students' observed behavior of bringing in consumables in spite of restrictions. One can now see open and extensive consumption of food and drinks at the Dewey Library – especially at lunchtime. It was observed that many students would come directly to the library with food from the Sloan School café close by. They would then sit at the desks working and eating simultaneously.

One of the distinctive characteristics of the space was its quietude. Level 1 of the library maintained a quiet environment in spite of the noise of laptop keyboards.
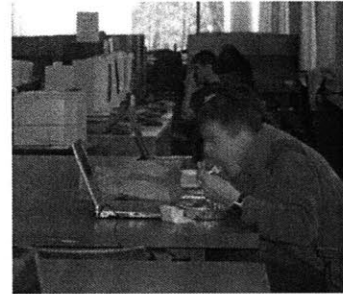
2. Redundancy and Constraints of the Furniture Design & Layout

Level 1 of the library has three types of seating arrangements – 57 individual carrels, soft seating, 6 group reading desks and 24 library computer terminals.

Unlike at the MIT Libraries Information Intersection, there were very few users seen chatting with each other, doing group work and meeting by chance on level 1 of the library. Most of them came here independently and left alone without interacting with others. This behavior could be partly attributed to the enclosed carrels placed back-to-back blocking each other's view and not allowing interaction. Nevertheless, the carrels were used extensively along with the use of group reading desks. This observation suggests a demand for both isolated as well open reading areas in the Dewey Library.
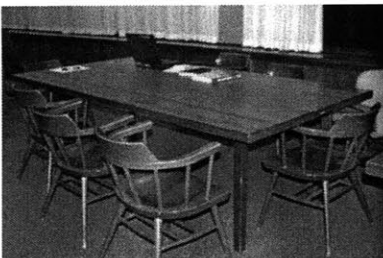
Group reading desk   *Soft seating*   *Individual carrel*

The soft seating (eight seats) available at one end of the library near the windows and the magazine shelves was used infrequently as most users preferred working with their laptops, read or write notes at the group reading desks and individual carrels. Constant movement characterized this part of the reading area with an average time of occupancy of 15 minutes.

Many users were seen relaxing with their heads on the desks during the noon hours. Others made themselves comfortable by making makeshift furniture arrangements. Users seemed to demand more comfortable lounge furniture.
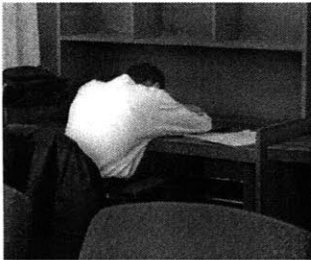
Library in need of comfortable lounge furniture
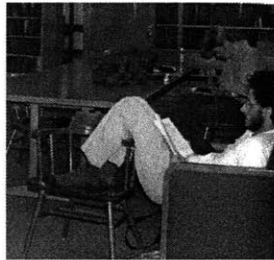
Carrels block users view from each other

With the extensive use of laptops and remote access to library resources, the elaborate carrel design with shelves originally designed for books and other print material proves to be in disuse today. The shelves were seen being used mainly for holding drinks and cell phones and occasionally for student notes.

Wastage or innovative use of carrel space?

3. The Library- a Study Space with Digital Devices

During the hourly observation, the library was found to have more number of users with laptops, PDAs and at the library's computer terminals than the number of users without any digital devices. Most users (with or without laptops) were seen busy studying, taking notes etc. Many people who used laptops or library terminals used the Internet for browsing and emailing. Four users who did not possess laptops were seen shunting between their seats and library computer terminals to access online information. Very few people were seen using Instant Messengers.

In my time of observation, only one person was seen browsing the reference book stacks on level 1. None was seen using the microfiche. There were occasional users checking books out or consulting librarians. Users seen consulting with librarians were approximately in the age group of 50 to 60 years.

4. Extensive Use of Cell Phones in the Library

Most users were seen carrying and using cell phones while in the library. They talked on their phones in hushed tones inside the library or stepped out to use the phone in the lobby and a few women (including myself) used the phone in the library restroom. Stepping out of the library several times to talk on the cell phone seemed inconvenient yet many users were seen doing that. Many users charged their phones while sitting in the library (See Table 1, Appendix D).

Few users talk on the cell phone in the library

Most users using the cell phone in the lobby

5. Group Study Rooms

A few graduate students interviewed on level 2 of the library (group study rooms) complained about the noise from other groups working in adjacent rooms. They reported that the rooms were not well designed acoustically, fell short of power outlets and were not equipped with projectors. Noise and inadequate technological infrastructure in the group study rooms proved inconvenient for the demands of their group work. Nevertheless, these rooms were used heavily due to lack of availability of other group study facilities at the Sloan School campus.
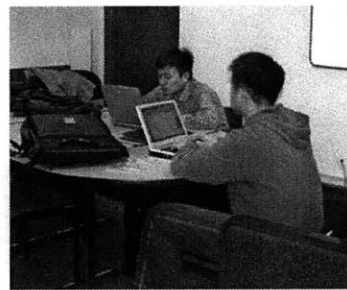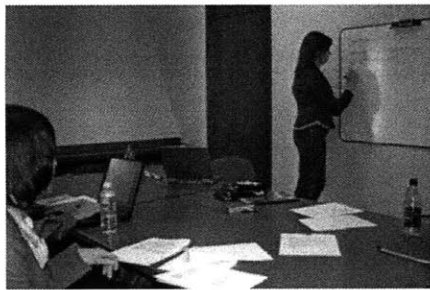
Mixed media use – white board, laptops, pens and paper in the group study rooms

Notes on the observations at the MIT Libraries

Observations at the Dewey and the Stata MIT Libraries Information Intersection point to the general trend that while working independently students like to work with co-present others and background noise but while working in a group they still prefer isolation and quietude. Irrespective of the facilities and resources provided, both library spaces are extremely successful in terms of the number of users. Dewey Library's success in terms of the number of users visiting it could be largely due to its proximity to the Sloan School of Management and its exclusivity in being the only library facility on the east campus of MIT. MIT Libraries Information Intersection's success in terms of the number of users can be largely attributed to its convenient location on the high traffic Student Street of the Stata building.

7. Conclusions and Recommendations

The four case studies were chosen for the research to compare the old and the new in library space design. Studying the space and usage at the sites revealed that the new libraries (the SPL and the MIT Libraries Information Intersection) were designed to accommodate the observed changing user behavior in the older libraries. The user research study reveals that the design strategies adopted by the two new libraries have been successful in terms of drawing users to the library spaces.

This leads us to the discussion of what can be learnt from these design endeavors, the resulting user behavior and the future of physical libraries.

7.0 Future of Physical Libraries

As studied in Chapter 2, libraries dealt with only physical changes till they were predominantly designed for books and till then they remained strongly institutional. Usage patterns of the MIT libraries show that in the presence of digital media and remote access, most of the library information resources are accessed online from outside the library and the library space is mainly used for private & group study with or without laptops and accessing the Internet. It was observed that there was substantial use of library's print resources as well as library computers & personal laptops in public libraries. If the contemporary library's function of being a digital technology enabler is excluded from its program, existing libraries could occupy much smaller spaces to function only as information repositories with the provision of a small space for few readers. This implies that the architecture of future libraries need not be grand with huge expansive reading rooms. Contrary to this the author's observations reveal that existing and new libraries are moving towards compaction only as information repositories but are expanding their community services and increasing their space requirements to provide a grand public space.

The public sphere of the library is more vibrant and diverse today in spite of users possessing remote access to most of the library resources. As inferred through the fieldwork, the demand for use of library information resources at its physical location is much less or equal to the demand for use of its public space for activities unrelated to its information resources. It can be said that if libraries did not provide an inviting public realm, library spaces of the future would be challenged for patron use. It is important for libraries to design for the print, the digital media and the public, all together, for them to continue to hold the architectural, symbolic and institutional importance in society.

7.1 The Emerging Trends – the New versus the Old

The case studies exhibited new uses of the library space that were unconventional to the libraries in the past. Users were seen using the space as a cafeteria, an Internet café, a private and group study space, a workplace, a lounge for relaxing and as a public park. Extensive use of laptops and cell phones was observed at all four sites. These activities stood out more than

the conventional activities of patrons immersed in serious study with library books and monographs and consulting librarians.

The survey results suggest that the MIT Libraries Information Intersection is more successful than Dewey library in terms of user preferences. The survey participants described the Stata library space and their feelings there in as calm & relaxed, convenient, well positioned, productive, happy, quiet, peaceful, focused, great for group work, exposed, as having hard benches and loud. Descriptions and feelings about the Dewey library were – feeling of being lost, 'wish I were outside', sleepy, old, hot, uncomfortable, sunlight deprived, difficult to find space, frustrated, ugly, focused, relaxed and peaceful (See Appendix Q). These answers point to the fact that more users are satisfied with the quality of space of the new compact Stata MIT Libraries Information Intersection as opposed to that of the big, old Dewey Library. This highlights a trend where more and more library users today prefer informal spaces with background noise & co present others, spaces with flexibility to multi-task and conduct group work and an efficient infrastructure that serves the technological needs of all kinds of users (with or without personal electronic devices).

The MIT Libraries Information Intersection case study shows that a library-like space can exist and be successfully used in a small 13' X 13' room today. But the function of this library space has expanded into other services not limited to providing access to print and digital information. It serves as a space for informal tutorials, group work, catch up space for friends, café space and individual study space. The same holds true for the new Seattle Public Library where the space serves as a reading room, workplace, Public Park and an entertainment center. In other words, libraries are evolving into flexible public spaces characterized by mixed use.

The study of MIT Libraries Information Intersection and Dewey Library also points to the importance of convenient location and easy accessibility of the library space resulting in its extensive use. This observation is very relevant to university libraries where students' work/study spaces are moving out from their rooms to any spot with a power port and wi-fi connection. Students seem to have developed a preference for background noise and other activities accompanying these spots. These kind of spots are usually found in cafés and their spill- outs and other public areas like student community centers, studios etc. on university campuses.

The minimal correlation of the design goals of the MIT Libraries Information Intersection to the conventional functions of a research library, the compaction of the library into a room, the subsequent successful usage of the space and the unconventional usage patterns at different libraries allude to the changing role and form of library spaces. The idea of a well-defined building type for the institution of the library is breaking down with unclear boundaries and ambiguity in library services to be provided with the fast changing technology and user needs.

7.2 Recommendations

Based on this study, following recommendations are suggested for libraries to achieve more functional spaces in the environment of evolving technologies:

A) Design library spaces for Mixed Use

1. Library infrastructure should be designed to serve a variety of users – people with/without laptops and other electronic devices and people with a range of technical expertise. Users new to the technology provided in libraries should be given assistance or the technology should be made easier to use
2. Provide ample number of computers for public use (especially in public libraries) along with enough power ports for laptop use
3. Provide access to the Internet in the library space to draw new users to the library and to serve existing users better
4. Spatial characteristics should allow multi-tasking of activities
5. Space should be designed for simultaneous use of different information media – print, digital and librarians
6. To cater to the demands of all types of users, create a mix of informal lounge as well as study spaces – provide comfortable soft seating, carrels and group reading desks
7. Provide a mixture of group study areas- isolated rooms with good acoustics and public group study areas. Most users prefer quietude and isolation while working in groups.
8. Allow use of cell phones in the public space by either segregating cell phone-use zones or encouraging talking softly. Cell phones are becoming an unavoidable user accessory.

B) Location and entry to the library should be easily accessible in both urban and university settings. Library should be strategically located to catch the laptop- carrying users

C) Allow people to use the reading room like any other public space as long as their activities are legal and do not disturb others. Some of these activities could be – open consumption of water and beverages, allow eatables in non-book stack areas, allow people to relax, talk to each other etc.

Contrary to the popular contemporary belief that technology and the Internet are bringing about social isolation, libraries studied as part of this research served as playgrounds for social activity and were found teeming with users. It can be said that the four libraries have succeeded in providing the appropriate spatial or technological environment (sometimes both) for bringing in the users together into the public space. Although users were collectively present in all libraries, only the two new libraries (the SPL and the MIT Libraries Information Intersection) seemed to facilitate social interaction amongst them. Even though healthy social interaction was 'observed' at the MIT Libraries Information Intersection, users gave more importance to using

wi-fi, laptops, browsing the Internet and consulting librarians than to the activities of social interaction in the survey conducted at the MIT Libraries. Whether future libraries should be designed to promote social interaction should be a decision subjective to the programs of different libraries.

We can conclude that existing as well as future libraries need to provide digital, print and human (librarians) information media simultaneously to function as efficient information resources. But to provide optimum information retrieval process and use, these media will need to coexist allowing unhindered access to each and yet allowing the opportunity to mix them. For physical libraries to continue to exist, they will have to serve as successful community spaces beyond serving as efficient information repositories. They will have to provide for a creative mix of public services to keep their patrons informed, educated and intellectually stimulated, an infrastructure for new technology uses and welcome new user practices with flexible architectural space and policies.

References

Battles Matthew. 2003. *Library - An Unquiet History.* W.W. Norton & Company, New York, NY.

Clausen Meredith. 2005. *Koolhaas and the [obsolete?] book.* Presentation at Seattle Public Library. Organized by Center for West European Studies, Seattle.

Given Liza M., Leclie Gloria J., *"Sweeping" the library: Mapping the social activity space of the public library,* Library and Information Science Research, 2003

Gupta Neeti. 2004. *Grande Wi-Fi: Understanding What Wi-Fi Users Are Doing in Coffee Shops.* Comparative Media Studies Thesis, Massachusetts Institute of Technology.

Lerner Fred. 1998. *The Story of Libraries: From the Invention of Writing to the Computer Age.* New York, Continuum.

OMAbook. 1999. *Seattle Public Library Proposal.* http://www.spl.org/lfa/central/oma/OMAbook1299/page4.htm

Pevsner Nikolaus. 1976. *A History of Building Types.* Princeton: Princeton University Press.

Seattle Post-Intelligencer. May 2004. *Cool House- A Guide to Seattle Central Library.* Section F.

Whyte William Foote, 1989. *Learning From the Field: A Guide from Experience.* Sage Publications, London.

Webb E.J., Campbell D.T., Schwartz R.D., Sechrest L., 1966. *Unobtrusive Measures.* Rand McNally & Company, Chicago.

Wikipedia on Library: http://en.wikipedia.org/wiki/Library

Bibliography

Battles Matthew. 2003. *Library - An Unquiet History.* W.W. Norton & Company, New York, NY.

Bennett Scott. 2003. *Libraries Designed for Learning.* Council on Library Resources. 83 p. Washington, D.C

Berdie Douglas R., Anderson John, 1974. *Questionnaires: Design and Use.* The Scarecrow Press, Inc. Metuchen, N.J.

Bishop Ann Peterson, House Nancy Van, Buttenfield Barbara P., 2003. *Digital Library Use: Social Practice in Design and Evaluation.* Cambridge: MIT Press.

Borgman C.L., Bates M.J., Cloonan M.V., Efthimiadis E.N., Gilliland-Swetland A., Kafai. Y, Leazer G.L., and Maddox A., 1996. *Social Aspects of Digital Libraries.* Final Report to the National Science Foundation, Computer, Information Science and Engineering Directorate, Division of Information, Robotics and Intelligent Systems; Information Technology and Organizations Program.

Borgman, C.L., Gilliland-Swetland A.J., Leazer G.L., Mayer R., Gwynn D., and Gazan R., 2000. *Evaluating Digital Libraries for Teaching and Learning in Undergraduate Education: A Case Study of the Alexandria Digital Earth Prototype.* Library Trends 49(2), (228-250).

Brown Barry, Green Nicola, Harper Richard, Eds. 2002. *Wireless World: Social and Interactional Aspects of the Mobile Age.* London: Springer.

Brown John Seely, Duguid Paul, 2000. *The Social Life of Information.*Cambridge, Harvard Business School Press.

Canfora Luciano. 1990. The Vanished Library - A Wonder of the Ancient World. University of California Press, Berkeley & Los Angeles, CA, USA.

Committee on an Information Technology Strategy for the Library of Congress, Computer Science and Telecommunications Board, National Research Council, 2000. *A Digital Strategy for the Library of Congress.* National Academy Press, Washington DC.
URL: http://www.nap.edu/books/0309071445/html/

Covi L.1996. *Social Worlds of Knowledge - Work: How Researchers Appropriate Digital Libraries for Scholarly Communication.* In G. Whitney, ed. ASIS Mid-Year Meeting Proceedings: The Digital Revolution: Assessing the Impact on Business, Education, and Social Structures (pp 84-100). Medford, NJ: Learned Information.

Dillon A., 2000. *Spatial-Semantics: How Individual Users Perceive Shape in information Space.* Journal of the American Society for Information Science, 51(6), 521-528.

Duderstadt James J., Atkins Daniel E., Houweling Douglas Van, 2002. *Higher Education in the Digital Age - Technology Issues and Strategies for American Colleges and Universities.* Praeger Publishers, Westport, CT.

Hill L.L., Carver L., Larsgaard M., Dolin R., Smith T.R., Frew J., and Rae M.A., 2000. *Alexandria Digital Library: User Evaluation Studies and System Design.* Journal of the American Society for Information Science, 51(3), 246-259.

Lakoff G. and Johnson M., 1980. *Metaphors We Live By.* Chicago Press.

Lerner Fred. 1998. *The Story of Libraries: From the Invention of Writing to the Computer Age.* New York, Continuum.

Library of Congress, 1993, American Memory User Evaluation 1991-1993: Site Summaries. Report prepared by the American Memory User Evaluation Team, Washington DC.

Lyman, P.1996. *What Is a Digital Library? Technology, Intellectual Property, and the Public Interest.* Daedulus, Journal of the America Academy of Arts and Sciences, 125(4), 1-33.

Markey, K.1984. *Subject Searching in Library Catalogs: Before and after the Introduction of Online Catalogs.* Dublin, OH:OCLC Online Computer Library Center.

Meyrowitz, Joshua. *No Sense of Place: The Impact of Electronic Media on Social Behavior.* New York: Oxford University Press, 1985.

Miksa F.1996. *The Cultural Legacy of the 'Modern Library' for the Future,* Journal of Education for Library and Information Science, 37(2), 100-119.

Mitchell, William J. 1995. *City of Bits: Space, Place and the Infobahn.* Cambridge: MIT Press.

Mitchell, William J. 2003. *ME++: The Cyborg Self and the Networked City.* Cambridge: MIT Press.

Olson, S. *"Redefine the library as an institution no longer exclusively dedicated to the book,"* How Seattle learned to stop worrying. Architectural Record. http://www.architecturalrecord.com/PROJECTS/SEPT00/PEOPLE/koolhaas.asp

Pevsner Nikolaus. 1976. *A History of Building Types.* Princeton: Princeton University Press.

Regenstein Carrie E. and Dewey Barbara. I. 2003. *Leadership, higher education, and the information age: a new era for information technology and libraries.* New York: Neal-Schuman Publishers.

Space Syntax, 2001. *Observation Procedures*. London.

Webb E.J., Campbell D.T., Schwartz R.D., Sechrest L., 1966. *Unobtrusive Measures*. Rand McNally & Company, Chicago.

Whyte William Foote, 1989. *Learning From the Field: A Guide from Experience*. Sage Publications, London.

Wisner William H., Jefferson N.C., 2000. *Whither the postmodern library? : Libraries, technology, and education in the information age*. McFarland & Co.

Other journals and websites related to libraries and information technology:

- Libraries and Culture. University of Texas Press
- Portal: Libraries and the Academy. The John Hopkins University Press
- D-Lib Magazine - http://www.dlib.org/
- Digital Libraries Initiative Phase 2: http://www.dli2.nsf.gov
- www.futuresproject.org
- http://wireless.newsfactor.com/

Note: *Unless otherwise noted, all pictures in the document have been taken by the author.*

Appendices

Appendix A: User data of the Central New York Public Library

Table 1 – Day 2 Users in *Room A

Time	Users with Laptops	Users with other reading material	Total users
10 am	2	13	15
10.30 am	4	17	21
11 am	8	29	37
11.30 am	11	34	45

Table 2- Day 2 Users & Activities

User Id	Reading Room	Gender	Approximate Age	Possessions	Activities
User 1	Room A	Male	25 - 30	Newspaper, sheets of paper, pens, pencils, coat	Reading newspaper.
User 2	Room A	Female	25 - 30	Handbag, water bottle, notebook, pen, coat	Reading & writing
User 3	Room A	Female	25-30	Laptop, printed sheets of paper, hand bag	Typing on the laptop, reading sheets of paper, eating candy on the sly from time to time
User 4	Room A	Female	40-50	Knotted sack of cloth, library books from the reference shelves	Reading

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* Part of the reading room without Ethernet and public computers

User 5	Room A	Male	25 - 30	Laptop, bag, book, head phones, jacket	Reading book, typing and reading from laptop, uses headphones, goes to the information desk leaving laptop on desk, goes to the other side of the reading room, returns and leaves with possessions
User 6	Room A	Male	40 - 60	Laptop, mouse, book, sheets of reading material, coat	Viewing photos, reading & typing on the laptop
User 7	Room A	Female	30 - 40	Handbag, notebook, personal book, jacket	Reading
User 8	Room A	Male	30 - 40	Laptop, wireless card, bag, jacket	Typing and reading on the laptop,
User 9	Room A	Male	60 - 70	Bag, book, coat	Reading
User 10	Room A	Male	25 - 30	Book, bag	Reading, staring at the room from time to time, went out of reading room twice for 5 minutes each, leaving his bag & book behind
User 11	Room A	Male	40 - 50	Laptop, bag, sheets of printed paper, pencil	Shuffling through sheets, shuts laptop off after ½ hour, starts reading sheets of paper

User 12	Room A	Female	20 - 25	Laptop, bag, sheets of printed paper & notes, notebook, cell phone	Referring to notes & printed sheets and typing on laptop, talking on the cell phone on the sly
User 13 (Couple A)	Room A	Male	30 - 35	Laptop, book	Walked in together, talking to the User 14, reading on laptop
User 14 (Couple A)	Room A	Female	25 - 30	Personal book	Talking to User 13, head down on the desk
User 15	Room A	Male	25 - 30	Laptop, paper, folders, pens, markers, reading material, canned juice drink	Reading on laptop, drinking juice on the sly
User 16 (Couple B)	Room A	Male	45 - 50	Laptop, leather bag	Showing laptop contents to User 17
User 17 (Couple B)	Room A	Male	35 - 40	Notebook, file folders	Reading material from User 16's laptop
User 18	*Room B	Male	45 - 50	Newspaper	Staring at the newspaper, dozing off
User 19	Room B	Male	50 - 60	Laptop, dictionary, bag, sheets of paper, book, spectacles, jacket	Working on the Word processor on laptop, referring to book and dictionary
User 20	Room B	Male	25 - 30	None	Watching others, leaves the room twice for 15 minutes each

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* Part of the reading room with Ethernet and public computers

User 21	Room B	Male	30 - 35	Handbag, cell phone, personal book, notebook, sheets of paper	Reading the sheets of paper, walks to the other side of the room to look for a friend

Table 3 – Day 3 Users and Activities

User Id	Room	Gender	Approximate Age	Possessions	Activities
User 22	Room B	Male	50 – 60	Laptop, handbag, jacket	Reading from laptop
User 23	Room B	Male	60 - 70	2 library books, call slips, hat, spectacles, jacket	Reading a book, gets more books from pick-up desk
User 24	Room B	Female	20- 25	Laptop, web cam, personal books, notebook	Instant Messaging
User 25	Room B	Male	35 - 40	2 library books, pen, sheets of paper, folder	Reading, watching the ceiling and others
User 25 (Couple C)	Room B	Male	30 - 35	Laptop, Bag jacket	Working on laptop, talking to User 26
User 26 (Couple C)	Room B	Female	30 - 35	Book, notebook, pen	Reading, talking to User 25
User 27 (Couple D)	Room B	Male	20 - 25	Laptop, bag	Showing laptop contents to User 28
User 28 (Couple D)	Room B	Male	20 -25	None	Typing on User 27's laptop

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Table 4: Day 3 Number of Users at key locations

Time	Users at Public Computers for Internet Access (Total 24)	Users at Public Computers for Electronic Resources Access (Total 24)	Users with Laptops accessing the Internet	Other Users- reading / writing from books or laptops etc.
10 am	4	2	4	5
11 am	18	11	15	24
12 pm	15	2	28	26 (inc. 3 with laptops)
1 pm	15	10	40	54 (inc. 7 with laptops)
2 pm	15	12	43	65 (inc. 1 with laptop)
3 pm	18	12	45	70
4 pm	19	15	43	80
5 pm	18	15	41	81
5.45 pm	18	14	30	45

Appendix B: User data of New Central Seattle Public Library

Table 1- Day 2 Users & Activities

User Id	Location	Gender	Approximate Age	Possessions	Activities
User 1	Living Room/Reading Room	Male	60 - 70	Newspaper, book, plastic bag	Reading newspaper, book
User 2	Living Room	Male	60 - 70	Book, headphones	Reading
User 3	Living Room	Male	25-30	Laptop, book, hand bag	Working on laptop
Couple A	Living Room	Male, Female	Both 30 -35	Playing cards, water bottle, a jacket & paper bag with the lady	Playing cards, wandering around in the library
User 4	Living Room/Mixing Chamber/kids level	Male	30 - 40	Cell phone, plastic bag	Sending SMS, reading library newspaper, surfing on Internet
User 5	Living Room	Male	30 - 40	Laptop, mouse, keypad, leather bag, plastic bag, jacket	Playing video games
User 6	Living Room	Male	60 -70	Trolley, 2 bags, jacket	Sleeping and watching others
Couple B	Reading Room	Male, Female	Both 25 – 30	Laptop, 2 coffees, 3 books, handbag, earphones	Female – Reading Male – Typing on laptop, talking & kissing each other
User 7	Reading Room	Male	30 - 40	Book, bag	Reading book
User 8	Reading Room	Male	40 - 45	Laptop, spectacles, bag, newspaper	Reading newspaper, working on laptop
User 9	Reading Room	Male	25 - 30	Laptop, bag, cell phone, jacket	Working on laptop, surfing the web, receiving a call
User 10	Reading Room	Male	40 - 45	Laptop, cell phone	Working on laptop, surfing the web

User 11	Reading Room	Male	30- 40	DVD Player, Bag	Watching movies

Table 2 – Day 3 Users and Activities

User Id	Room	Gender	Approximate Age	Possessions	Activities
User 9	Reading Room	Male	25 - 30	Laptop, 2 books, bag, cell phone, jacket	Working on laptop, surfing the web, receiving a call
User 5	Living Room	Male	30 - 40	Laptop, mouse, keypad, leather bag, plastic bag, jacket	Playing video games
User 12	Reading Room	Female	20 - 25	Laptop, notebooks, bag, coffee, water bottle	Working on laptop
User 10	Reading Room	Male	40 - 45	Laptop, cell phone	Working on laptop, surfing the web
Couple C	Reading Room	Both Male	20 - 25	1 Laptop, 4 books, 1 cell phone	Working together on laptop
User 6	Living Room	Male	60 -70	Trolley, 2 bags, jacket	Sleeping and watching others
Couple A	Living Room	Male, Female	Both 30 -35	Playing cards, water bottle, a jacket & paper bag with the lady	Playing cards, wandering around in the library
User 11	Reading Room	Male	30- 40	DVD Player, Bag	Watching movies

Appendix C: User data of the Stata MIT Libraries Information Intersection

Table 1- Users, Activities & Day

User Id	Gender	Approximate Age in years	Possessions	Activities	Day
User 1	Male	25 - 30	Bag, laptop, notebook	Surfing online, checking email, referring to notebook, working on MS Excel	Wednesday Between 11 am – 12.30 pm
User 2	Male	18 - 23	Bag, laptop, earphones	Working on laptop, listening to music, gyrating while listening to music	Wednesday Between 11 am – 12.30 pm
User 3	Male	40 -45	none	Browsing community bookshelf, leaves with a book	Wednesday Between 11 am – 12.30 pm
User 4	Female	18 - 23	none	Browsing community bookshelf	Wednesday Between 11 am – 12.30 pm
User 5 (group A)	Male	18 - 23	Bag, laptop, sheets of paper, notebook, cell phone	Referring to notes, talking on cell phone outside the space and inside while working on laptop, working on laptop, talks to User 6, 7 & 8	Wednesday Between 5 pm – 8 pm
User 6	Male	18 - 23	Newspaper, food, drink, cell phone	Talking and laughing with User 5, looking at User 5's laptop, eating, reading newspaper,	Wednesday Between 5 pm – 8 pm

				relaxing, makes a call on cell phone	
User 7 (group A)	Female	18 - 23	Bag, notes	Talks to User 5 & 8, reads notes	Wednesday Between 5 pm – 8 pm
User 8 (group A)	Male	18 - 23	Bag, laptop, food, drink	Eating, reading from laptop, talks to User 5 & 7	Wednesday Between 5 pm – 8 pm
User 9	Male	40 - 50	Book	Retuned book at the Book return	Wednesday Between 5 pm – 8 pm
User 10	Female	30 - 35	Book	Retuned book at the Book return	Wednesday Between 5 pm – 8 pm
User 11	Female	18 -23	Laptop, bag, notebook, coffee	Working on excel on her laptop, sipping coffee	Thursday Between 6 pm – 7 pm
User 12	Male	18 - 23	Laptop, bag, coffee	Working on laptop, sipping coffee	Friday 9.15 am – 11 am
User 1	Male	25 - 30	Bag, laptop	Working on laptop	Friday 11 am – 1 pm
User 13	Female	20 - 25	Bag, laptop, food, drink	Working on laptop, eating simultaneously	Friday 11 am – 1 pm
User 1	Male	25 - 30	Bag, laptop, notebooks, can of soda	Working on laptop	Friday before 5 pm – 5. 10 pm
User 14	Female	18 - 23	Bag, notebook	Writing in notebook	Friday 5.10 pm – 5.40 pm
User 15 (couple A)	Female	18 - 23	Books, food	Talking & holding hands with User 16	Tuesday 3.30 pm – 4 pm
User 16 (couple A)	Male	18 - 23	Books, food	Talking & holding hands with User 15	Tuesday 3.30 pm – 4 pm
User 17	Female	30 -35	Books	Reading books	Tuesday 3.30 pm – 4 pm
User 18	Female	18 -23	none	Browsing community books	Tuesday 3.30 pm – 4 pm
User 19	Male	18 -23	bag	Browsing community books	Tuesday 3.30 pm – 4 pm

User Id	Gender	Approximate Age in years	Possessions	Activities	Day
User 20 (group B)	Female	18 - 23	Bag, Laptop, notebook, reading material, pen	Discussing problem set with User 21, 22, 23, showing laptop to others	Tuesday 5.30 – 6 pm
User 21 (group B)	Female	18 - 23	Bag, notebook, reading material, pen	Discussing problem set with User 20, 22, 23, talking on cell phone	Tuesday 5.30 – 6 pm
User 22 (group B)	Male	18 - 23	Bag, Laptop, notebook, reading material, pen	Discussing problem set with User 20, 21, 23	Tuesday 5.30 – 6 pm
User 23 (group B)	Male	18 - 23	Bag	Discussing problem set with User 20, 21, 22	Tuesday 5.30 – 6 pm
User 24 (couple B)	Female	20 - 25	Laptop, bag	Solving multiple choice question test on laptop, talking to User 25	Wednesday between 12 pm and 1 pm
User 25	Male	20 - 25	Laptop, bag	Solving multiple choice question test on laptop, talking to User 24	Wednesday between 1 pm and 2 pm
User 26	Male	18 - 23	Laptop, bag	Working on laptop, talking to User 27	Wednesday between 1 pm and 1.50 pm
User 26	Male	18 - 23	Laptop, bag, earphones	Working on laptop, talking to User 26, listening to music	Wednesday between 1. 10 pm and 2. 05 pm

| User 27 | Female | 18 - 23 | Laptop, bag, book | Reading book | Wednesday between 2. 10 pm and 2. 30 pm |

Appendix D: User data of the Dewey Library at MIT

Table 1- Users, Activities & Day

User Id	Gender	Approximate Age in years	Possessions	Activities	Day
User 1	Male	25 - 30	Bag, laptop, coffee cup	Working on laptop, sipping coffee in a carrel	Thursday Between 2.15 pm – 4.00 pm
User 2	Male	25 - 30	Bag, laptop, water bottle	Working on laptop, drinking water, in a carrel	Thursday Between 2.15 pm – 4.00 pm
User 3	Male	20 - 25	Bag, laptop, coffee cup	Working on laptop at a long table	Thursday Between 2.15 pm – 4.00 pm
User 4	Female	20 - 25	Bag, laptop, book, juice	Reading book, laptop kept open, at a long table	Thursday Between 2.15 pm – 4.00 pm
User 5	Male	25 - 30	Bag, laptop, notebook, pen, water bottle	Writing on notebook at a long table	Thursday Between 2.15 pm – 4.00 pm
User 6	Female	30 -35	Bag, laptop, cell phone & charger, coffee cup	Working on laptop and charging cell phone at a long table. Stepped out to call on cell phone	Thursday Between 2.15 pm – 4.00 pm
User 7	Female	20 - 25	Bag, Notebook	Reading from notebook, at a long table	Thursday Between 2.15 pm – 4.00 pm
User 8	Male	50 - 60	Bag, files	Consulted with librarian, using the library computer	Thursday Between 2.15 pm – 4.00 pm
User 9	Female	50 - 60	Bag	Consulted with librarian	Thursday Between 2.15 pm – 4.00 pm

User 10	Male	30-35	Bag, newspaper	Reading newspaper on comfortable chair	Tuesday between 5.30 pm and 8 pm
User 11	Female	20 -25	Bag, Book, cell phone	Reading Book at a long table, talking on cell phone	Tuesday between 5.30 pm and 8 pm
User 12	Female	25 - 30	Bag, laptop, cell phone	Working on laptop, talked on cell phone – at a long table	Tuesday between 5.30 pm and 8 pm
User 13	Male	20 - 25	Bag, book	Reading book at a long table	Tuesday between 5.30 pm and 8 pm
User 14	Female	20- 25	Bag, notebook, books	Going back and forth between reading book at the table and going online on library computer	Tuesday between 5.30 pm and 8 pm
User 15	Female	20 - 30	Bag, laptop, earphones, water bottle	Working on laptop with earphones and drinking water	Tuesday between 5.30 pm and 8 pm
User 16	Female	25 - 30	Bag, laptop, book	Reading book, relaxing and working on laptop at a long table	Tuesday between 5.30 pm and 8 pm
User 17	Male	25 - 30	Bag, cell phone	Working on library terminal, stepping out to talk on cell phone	Tuesday between 5.30 pm and 8 pm
User 18	Male	25 - 30	Bag, book, notebooks	Reading at a carrel	Tuesday between 5.30 pm and 8 pm
User 19	Male	20 - 25	Bag, book	Reading at a carrel	Tuesday between 5.30 pm and 8 pm

User Id	Gender	Approximate Age in years	Possessions	Activities	Day
User 20	Female	20 - 25	Bag, book, water bottle	Reading book, sleeping, drinking water, sitting at a long table	Wednesday between 12.30 pm – 2.30 pm
User 21	Female	25- 30	Bag, book, notes	Talking to User 22, 23, 24, reading notes	Wednesday between 12.30 pm – 2.30 pm
User 22	Male	25 - 30	Bag, laptop	Talking to User 21, 23, 24, working on laptop	Wednesday between 12.30 pm – 2.30 pm
User 23	Male	25 - 30	Bag, laptop, coffee	Talking to User 21, 22, 24, working on laptop, drinking coffee	Wednesday between 12.30 pm – 2.30 pm
User 24	Male	25 - 30	Bag, laptop, juice	Talking to User 21, 22, 23, working on laptop, drinking juice	Wednesday between 12.30 pm – 2.30 pm
User 25	Male	20 - 25	Bag, book, notebook	Reading, taking notes, sleeping at the long table	Wednesday between 12.30 pm – 2.30 pm
User 26	Male	25 - 30	Newspaper, bag	Reading library newspaper on a comfortable chair	Wednesday between 12.30 pm – 2.30 pm
User 27	Female	25 - 30	Bag	Reading a library magazine on a comfortable chair	Wednesday between 12.30 pm – 2.30 pm
User 28	Female	50 - 60	Bag	Reading library magazines on a comfortable chair	Wednesday between 12.30 pm – 2.30 pm

Appendix Q: Questionnaire results from 15 survey participants each at the MIT Libraries Information Intersection and the Dewey Library at MIT:

1. Age Group	Stata Participants	Dewey Participants
18 -21		
21-25		5
25-30		
30-35		6
35-40		2
40-45		1
45-50		1

2. MIT Affiliation	Stata Participants	Dewey Participants
Under graduate student	6	2
Graduate Student	9	11
Visitor		2

3. Residence Status	Stata Participants	Dewey Participants
On-Campus	7	3
Off-Campus	8	11

4. Frequency of visit to the library	Stata Participants	Dewey Participants
Everyday		2
Once every week	4	4
More than once a week	2	5
Do not visit the library ever	1	1

Others (Stata): twice a month, once a month, not very often, first time, rarely, once in a while
Others (Dewey): None this term, once a month, once in 2 months

5. Frequency of visit to the MIT library's online catalog	Stata Participants	Dewey Participants
Every day	1	
Once every week	1	3
More than once a week	6	1
Do not visit the online catalog		5

Others (Stata): once every 2 weeks, couple of time/semester, once a month, phases
Others (Dewey): Rarely, once every 2 weeks, less than once a week, once a month

6. Time spent in the space	Stata Participants	Dewey Participants
5 – 10 minutes	2	1
10 – 20 minutes	4	2
Up to 1 hour	3	7
2 – 3 hours	5	4

7. Mode of information access	Stata Participants	Dewey Participants
Search online catalog while in the library	5	4
Search online catalog from outside the library	14	9
Browse physical stacks for books	3	4
Browse physical stacks for journals	3	1
Search online journal databases while in the library	2	2
Search online journal databases from outside the library	8	6
Use library microfiche		
Consult librarian	3	8

8. Other activities while in the library	Stata Participants	Dewey Participants
Read online books	1	4
Read magazines, newspapers	8	7
Attend instructional tutorial or lecture	3	1
Download online music		

Other (Stata): Study, read community books, meetings
Other (Dewey): Study, read papers, group study, meetings, use as study space, read online journal articles

9. Mental images of the word 'library':

Stata
Cubicle desks, Barker dome, shelves of books from floor to ceiling, lot of books, quiet, studying at a table, books, comfortable chairs, stacks of books, Rotch, study spaces, book shelves, silence
Dewey
Silence, books, desk to work, barker library, stuffy, shelves of books, reading rooms, place of study, lots of books, relaxed environment for reading & technical works, quiet, large, people speaking in whispers, books, information searching & gathering, book stacks

10. Description of feelings when inside this library:

Stata
Calm & relaxed, calm & concentrated, convenient, well-positioned, productive, happy, quiet, peaceful, focused, exposed, studious, hard benches, loud, great for group work
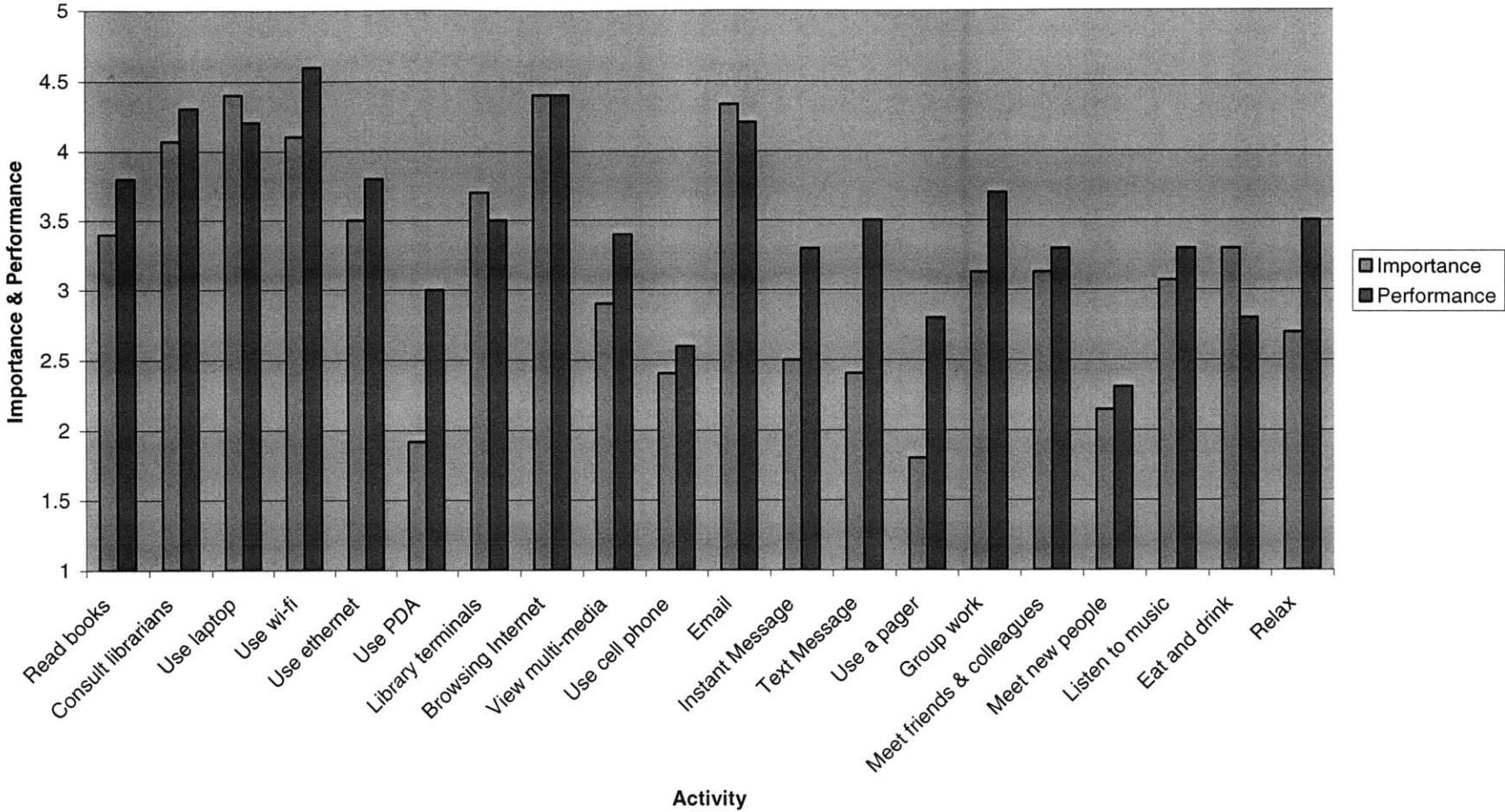**Dewey**
Lost, business focused, 'wish I were outside', sleepy, old, hot, uncomfortable, sleepy, sunlight deprived, solitude, peace of mind, difficult to find space, frustrated, focused, relaxed, old-fashioned, too much concrete, ugly, peaceful

Results of the **Importance** and **Performance** survey- each on a scale of 1 to 5 ranging from 'not very important' to 'very important' and 'very bad' to 'very good' respectively:

Activity	Stata Avg.Importance	Dewey Avg. Importance	Stata Avg.Performance	Dewey Avg.Performance
Read books	3.4	3.5	3.8	3.2
Consult librarians	4.07	4.1	4.3	4.3
Use laptop	4.4	4.8	4.2	3.7
Use wi-fi	4.1	4.8	4.6	4.4
Use ethernet	3.5	2.8	3.8	2.7
Use cell phone	2.4	2.4	2.6	2.5
Use PDA	1.92	3.25	3	3.9
Library terminals	3.7	3.3	3.5	3.5
Group work	3.13	3.8	3.7	2.6
Browsing Internet	4.4	3.7	4.4	3.5
View multi-media	2.9	3	3.4	2.9
Email	4.33	3.6	4.2	3.7
Instant Message	2.5	2	3.3	3.3
Text Message	2.4	1.4	3.5	3.3
Use a pager	1.8	1.2	2.8	3.2
Meet friends / colleagues	3.13	3.4	3.3	3.4
Meet new people	2.14	1.7	2.3	2.2
Listen to music	3.07	2	3.3	2.7
Eat and drink	3.3	2.9	2.8	2.5
Relax	2.7	3.2	3.5	2.3

Stata Library Survey Results

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Dewey Library Survey Results

Activity

Importance & Performance

Legend: Importance, Performance