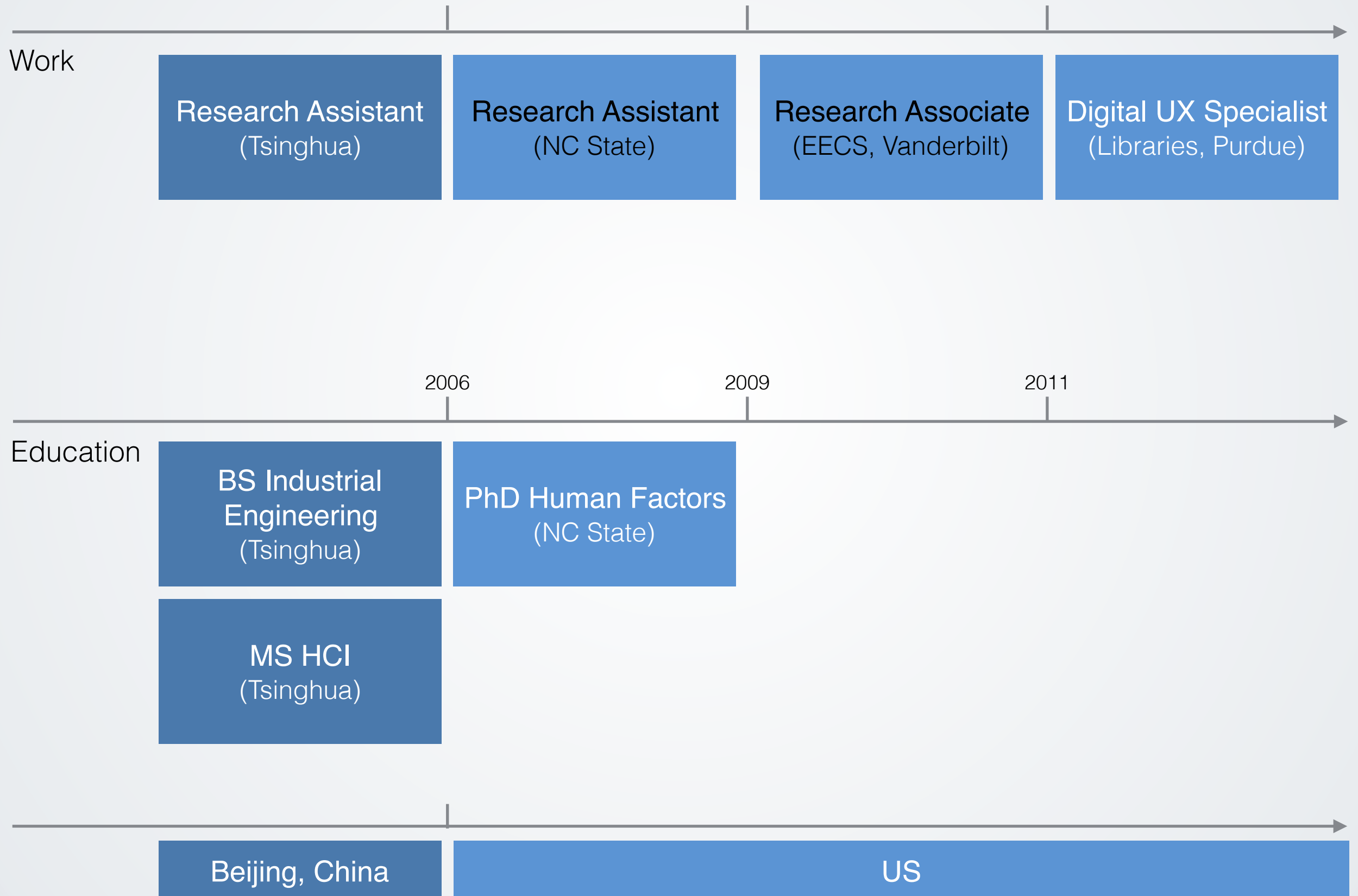


# UX Research Portfolio

---

Tao Zhang, PhD

# My Journey



# My Research

## Discovery



---

Ethnography  
Interview  
Personas Development

## Optimization



Data Analytics  
Iterative Evaluation

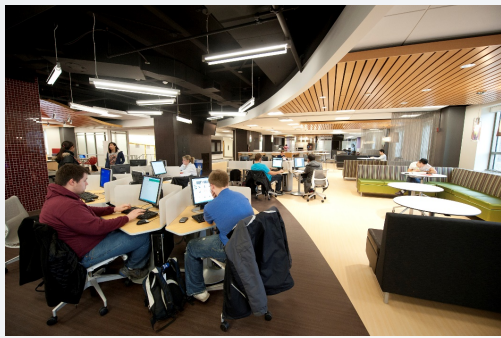
## Validation



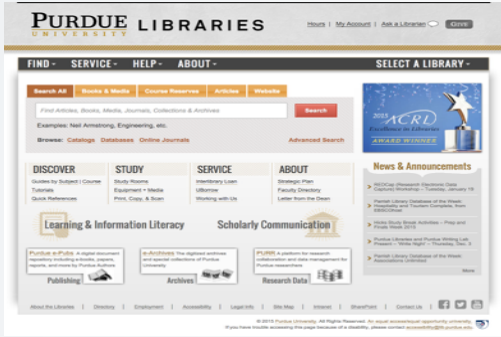
Usability Test  
Field Evaluation

# Selected Projects

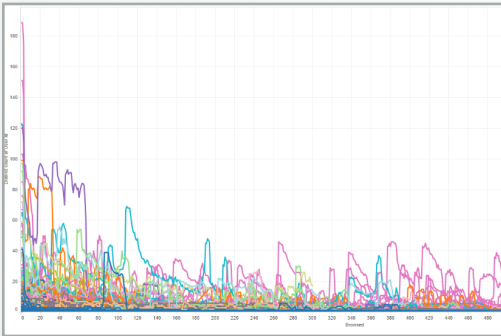
Ethnography



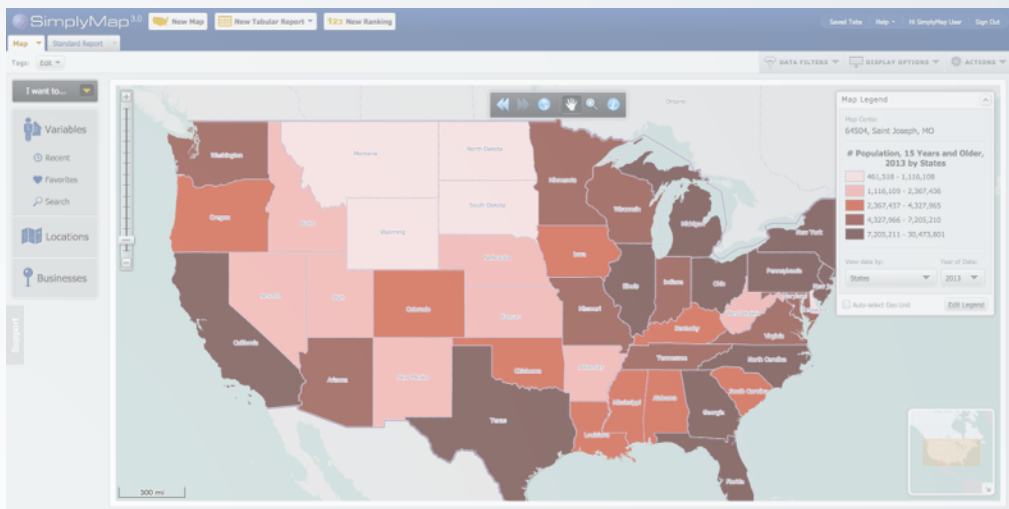
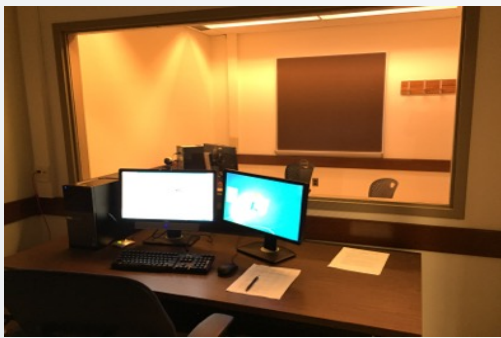
Personas



Data Analytics



Usability Test





# Active Learning Center

## Project Overview

- Latest building at Purdue to support “flip courses”
- ALC blends classrooms and library study space
- Student learning activities an important basis for designing ALC space

## Research Questions

- Student usage of existing library spaces
- Learning and work activities
- Study space needs

# Active Learning Center

## Method

Twice a day for a week  
at library study spaces  
observing space and  
technology usage

### Observations

### Design Workshops

Users draw and explain  
what they would like to  
see in a study space

Randomly distributed to  
students asking what  
they are doing and why  
they choose to be here

### Reply Cards

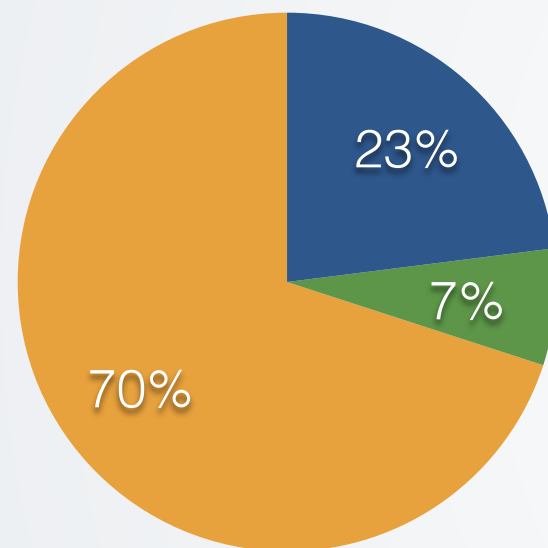
### Spot Interviews

5 min interviews asking  
students' current activity,  
how long they've been  
here, and why they  
choose the location

# Active Learning Center

## Observations

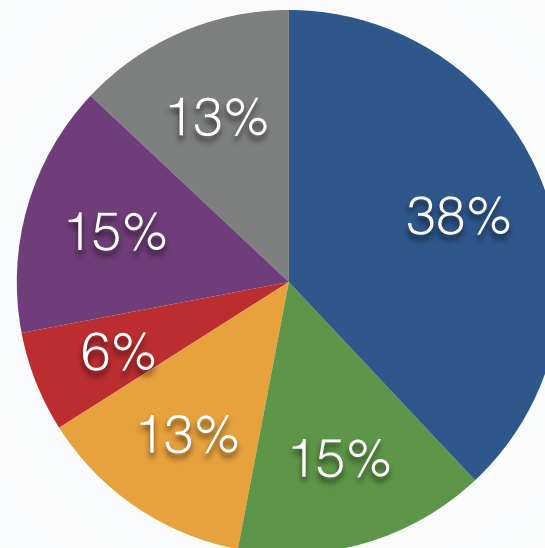
### How People Work



- Groups
- Sitting Together
- Individual

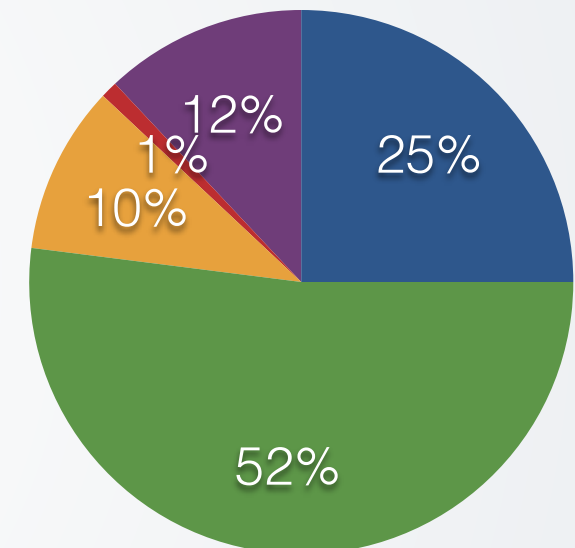
Average group size = 3.1  
SD = 2.2

### What People Use



- Technology
- Textbook & reading materials
- Notes
- Assignments
- Writing & highlighting
- Paper

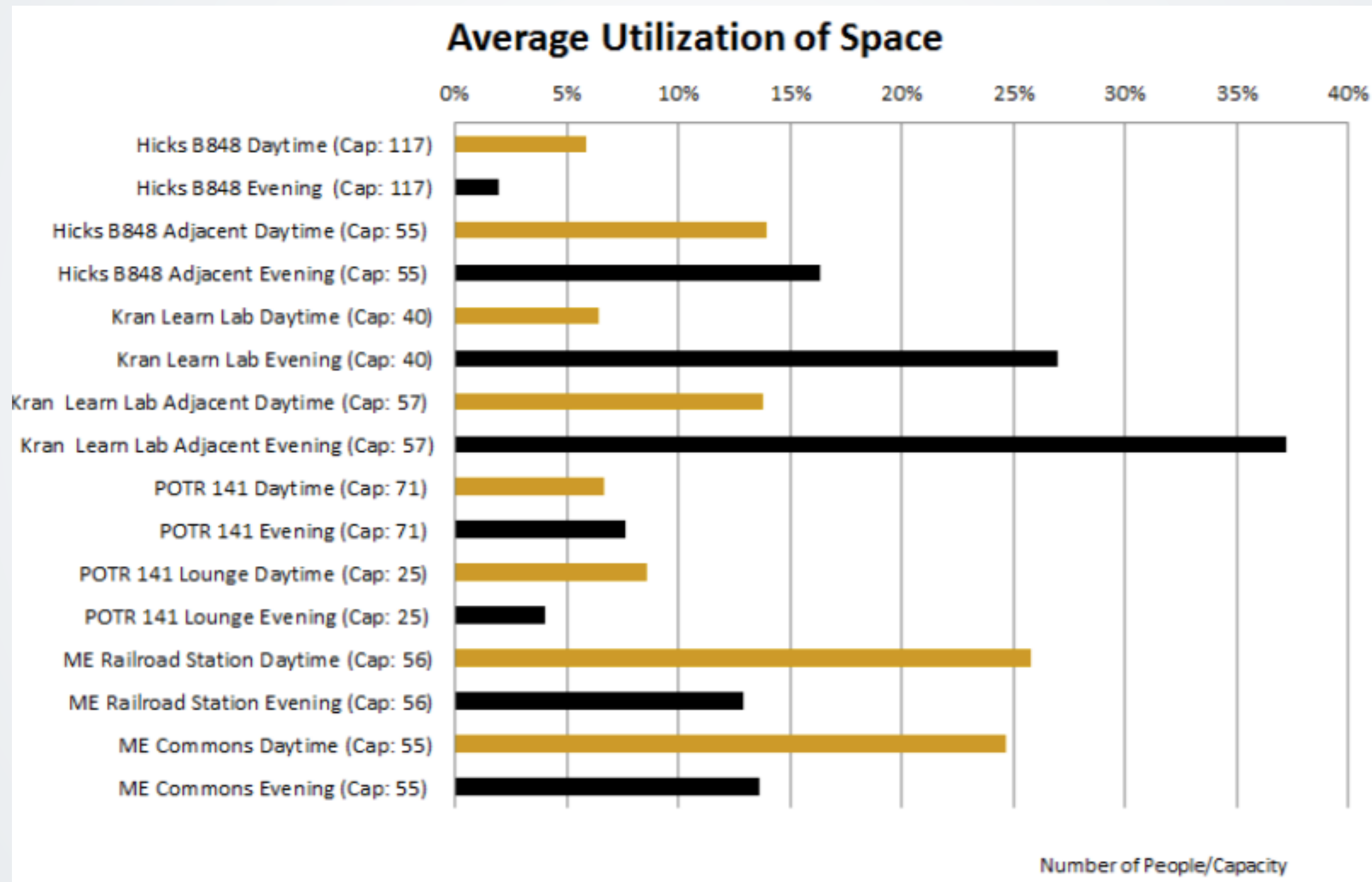
### Technology Use



- No Technology
- Personal Technology
- Library Technology
- Personal & Library Tech.
- Other

# Active Learning Center

## Observations



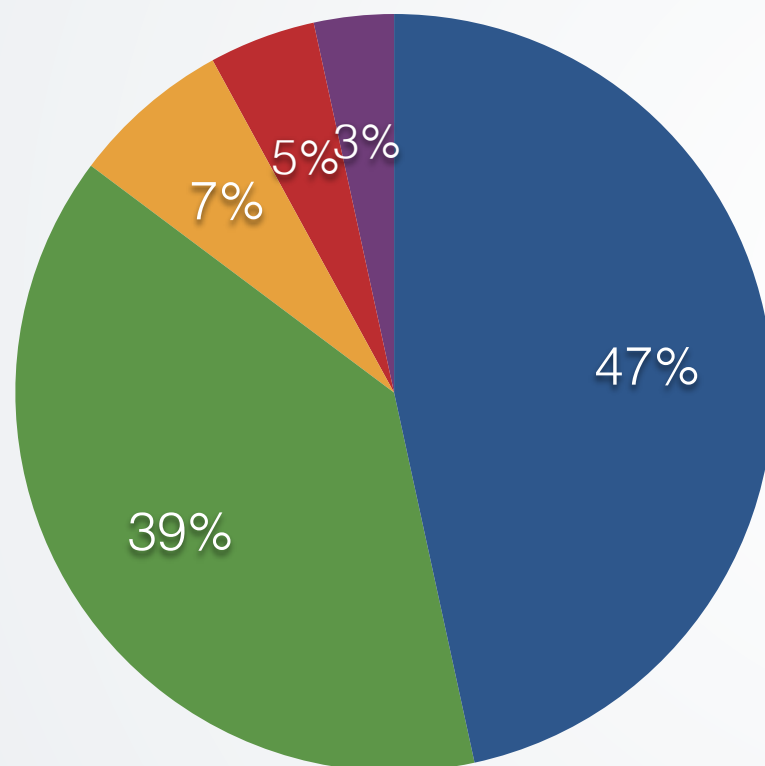
50% utilization ~ “completely full”



# Active Learning Center

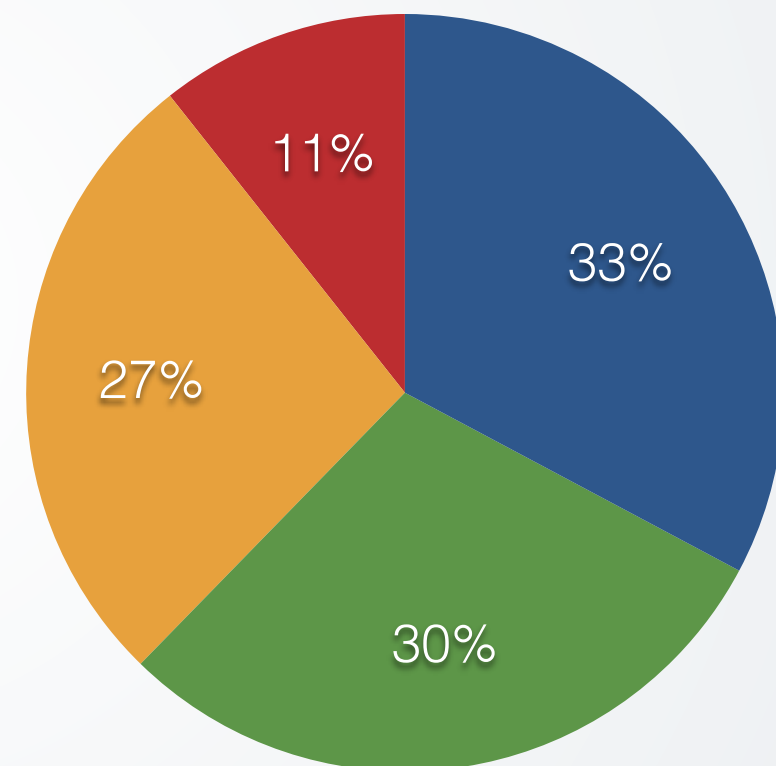
## Reply Cards

What Do Students Do



- Homework
- Study
- Take Breaks
- Online Activity
- Read

Why Come to Library



- Focus/Atmosphere
- Get Things Done
- Convenience
- Friends

# Active Learning Center

## Interviews

1-2 Hours

Time spent in the library

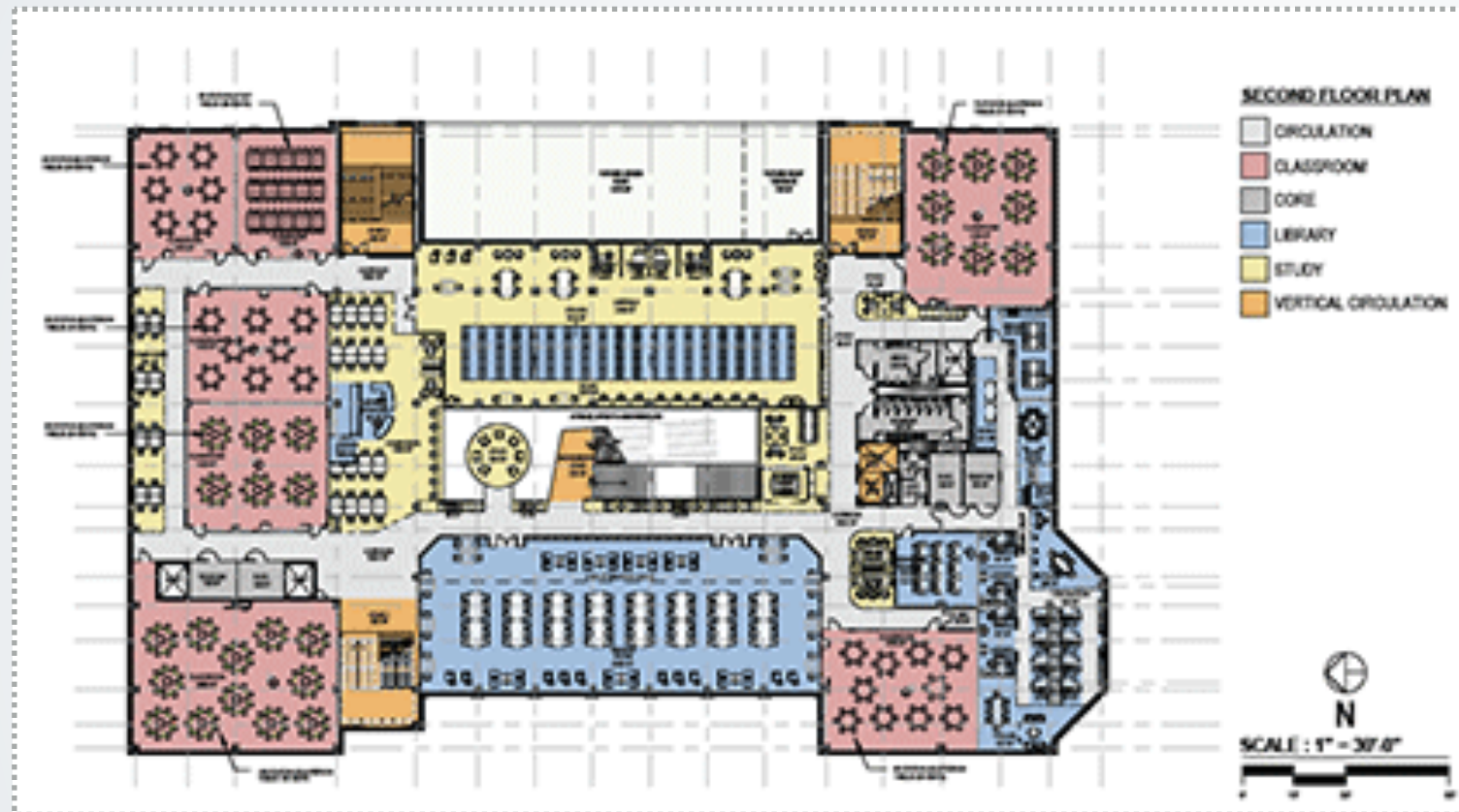
2-3 People

Doing work together

- Convenience of walking between classrooms and library spaces
- Students in spaces adjacent to classrooms are highly engaged in study
- Library spaces help students focus
- Space needs (group vs. individual) differ between day and evening
- Students need real-time space availability information

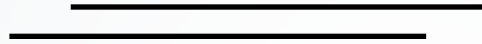
# Active Learning Center

## Impact



- Research results communicated with ALC stakeholders and architecture firm
- Existing library spaces renovated to support both individual studies and small group work

**Questions?**





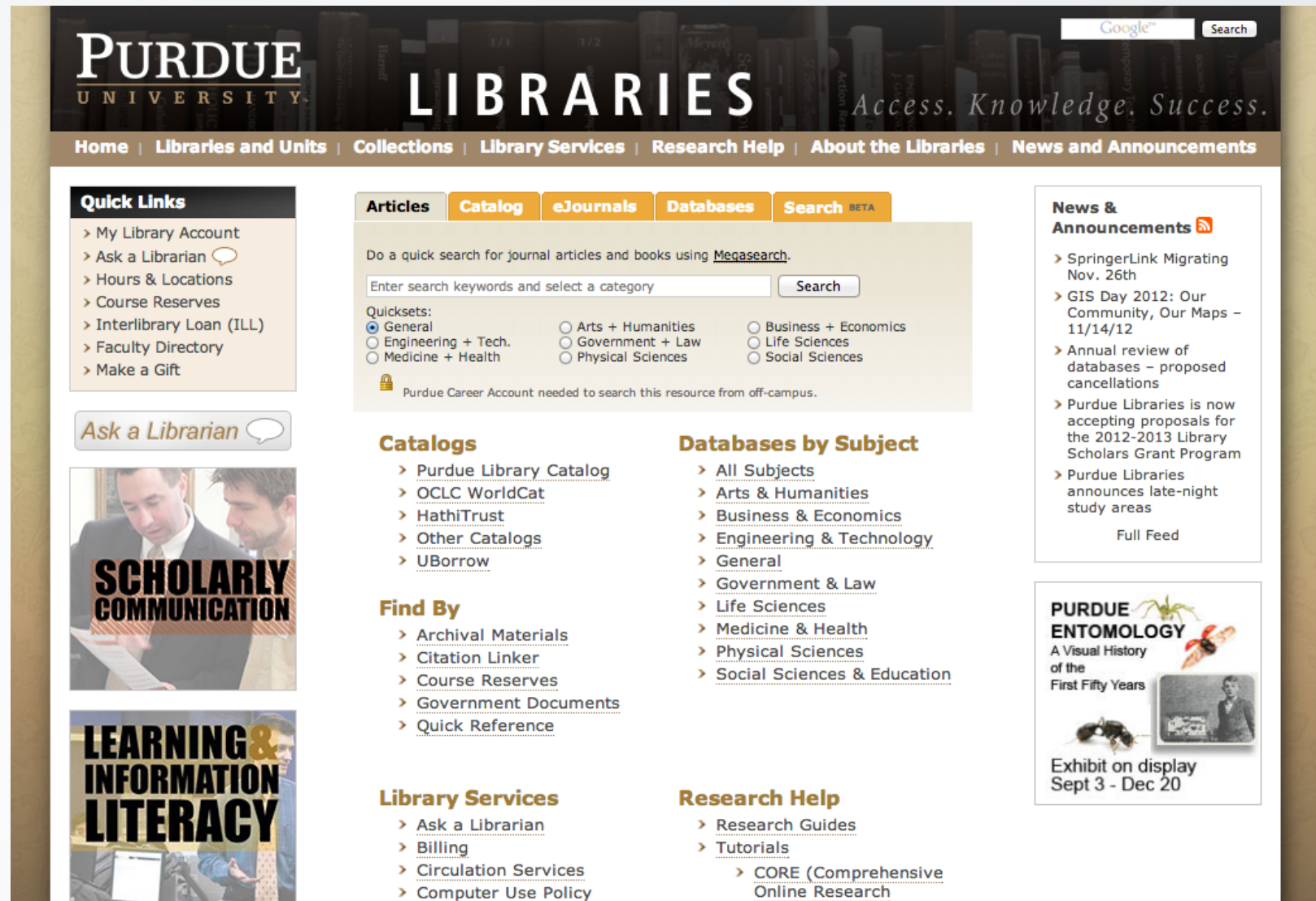
# Purdue Library Website

## Project Background

- Drupal implementation
- New discovery tool

## Research Goals

- Understand user needs
- Identify usability and content issues
- Input for visual design and implementation

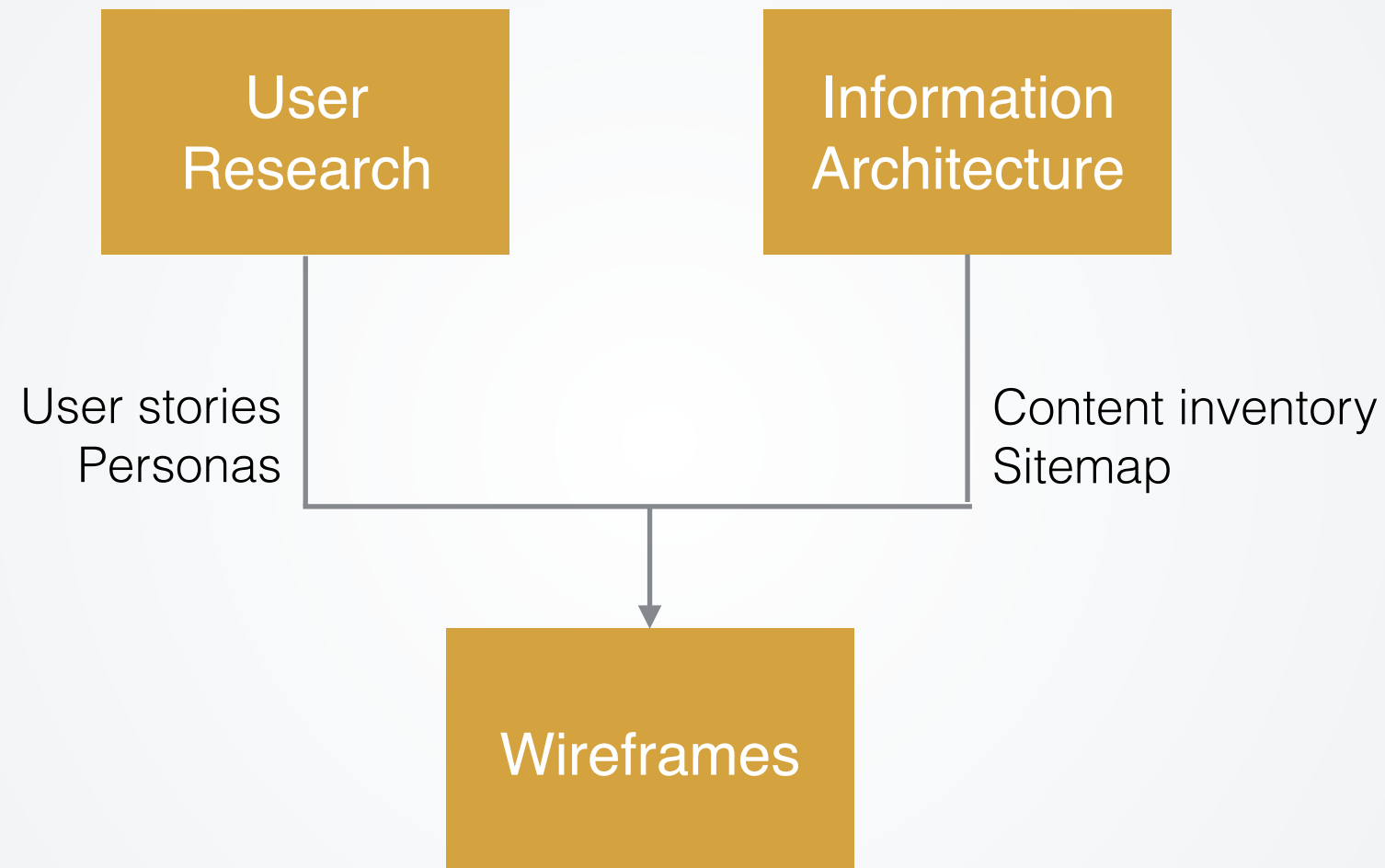


“Too many and often redundant links.”

“Difficult to find information.”

# Purdue Library Website

## Research Process



## Recruit Users

## Screening survey responses

# Purdue Library Website

## User Research



Contextual inquiry  
Interview



Library experience  
Library resources and services  
Study and research needs  
Information needs



User segments  
User stories  
Personas



# Purdue Library Website

## Personas



**Jenny**  
Sophomore

Library hours  
Course reserve books  
Known articles

---



**Brian**  
PhD student

Article discovery  
Full text access  
Database access

---

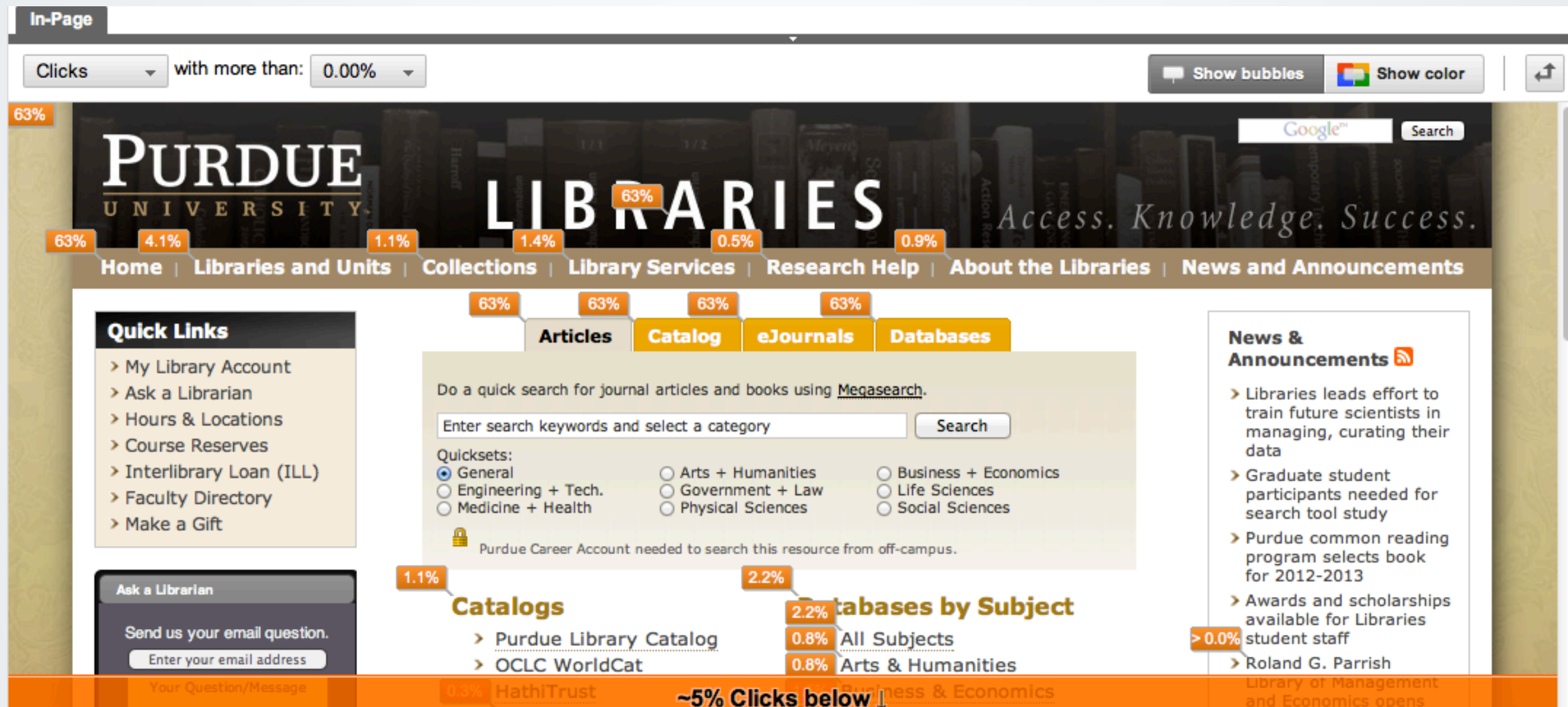


**Kate**  
Professor

Full text access  
Database access  
Instruction

# Purdue Library Website

## Homepage



# Purdue Library Website

## Homepage

Complex search options

Redundant links

Unclear visual hierarchy



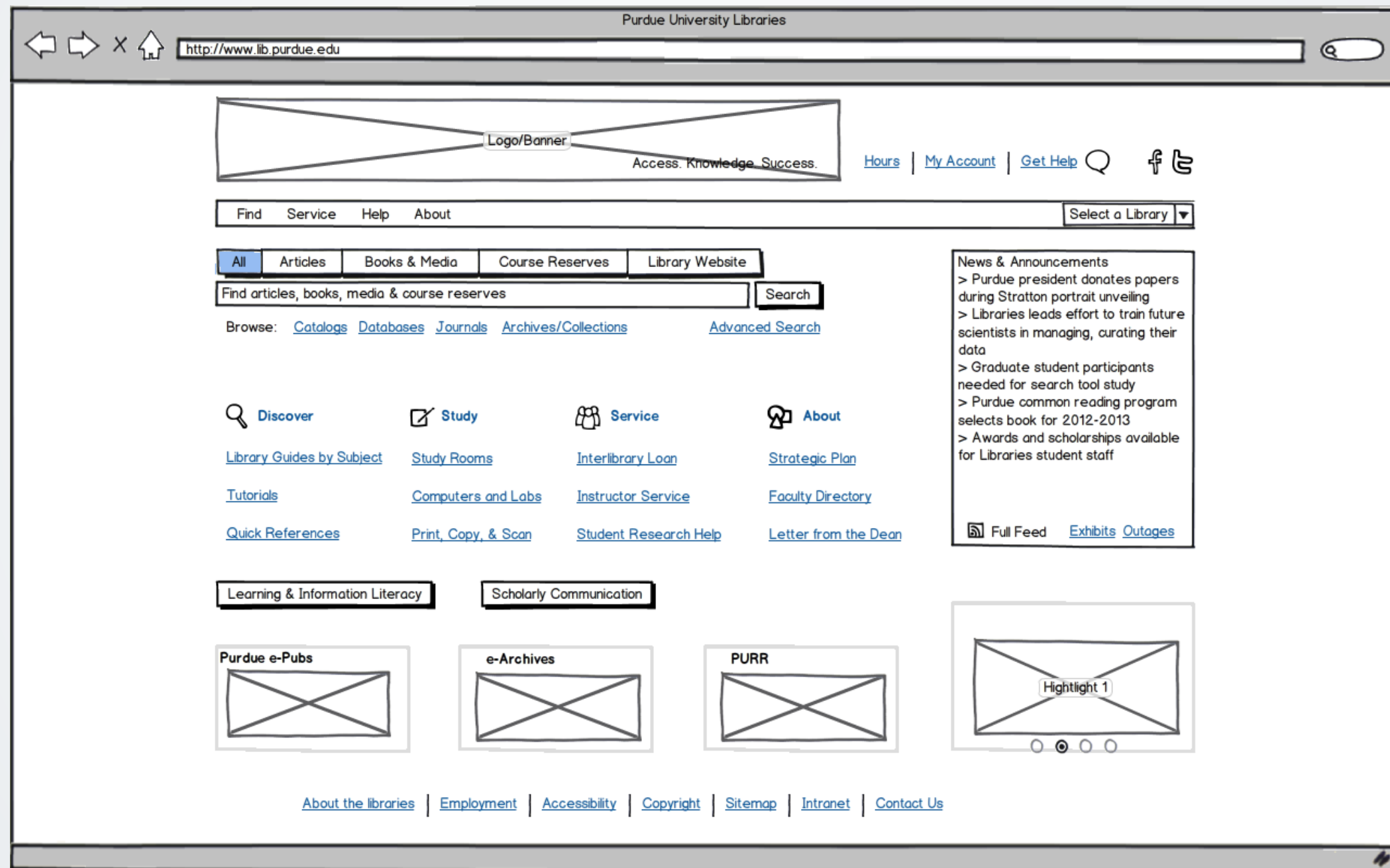
Multi-tab search box

User-oriented menu

Reduce clutter

# Purdue Library Website

## Homepage





# Purdue Library Website

## Hours

### Earth & Atmospheric Sciences Library

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

Civil Engineering Building 2215  
Telephone: (765) 494-3264  
Email: easlib@purdue.edu

### Engineering Library

See Siegesmund Engineering Library below.

### Hicks Repository

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

Hicks Undergraduate Library B849  
Telephone: (765) 494-6740  
Email: hkrp@purdue.edu

### Hicks Undergraduate Library (UGRL)

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

Hicks Undergraduate Library Ground Floor  
Telephone: (765) 494-9153  
Email: ugrl@purdue.edu

### Human Resources Office

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

Stewart Center 265  
Telephone: (765) 494-2899  
Email: hr@lib.purdue.edu

### Humanities, Social Science, and Education Library (HSSE)

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

Stewart Center 135  
Telephone: (765) 494-2831  
Email: hsselib@purdue.edu

### Information Technology and Resource Services

Contact [Hours](#) [Website](#) | [Maps](#) | [Staff](#) | [Details](#)

## Library Hours

Wednesday, April 11, 2012



Library	Hours
<a href="#">Archives and Special Collections</a>	10:00 am to 4:30 pm
<a href="#">Aviation Technology Library</a>	8:00 am to 7:00 pm
<a href="#">Black Cultural Center Library</a>	8:00 am to 9:30 pm
<a href="#">M. G. Mellon Library of Chemistry</a>	8:00 am to 10:00 pm
<a href="#">Earth &amp; Atmospheric Sciences Library</a>	8:00 am to 10:00 pm
<a href="#">Siegesmund Engineering Library</a>	8:00 am to 5:00 pm
<a href="#">Hicks Undergraduate Library</a>	7:00 am to 2:00 am
<a href="#">Humanities, Social Science, and Education Library (HSSE)</a>	8:00 am to 12:00 am
<a href="#">Life Sciences Library</a>	8:00 am to 10:00 pm
<a href="#">Mathematical Sciences Library</a>	8:00 am to 10:00 pm
<a href="#">Pharmacy, Nursing, and Health Sciences Library</a>	8:00 am to 10:00 pm
<a href="#">Physics Library</a>	8:00 am to 10:00 pm
<a href="#">Roland G. Parrish Library of Management and Economics</a>	8:00 am to 3:00 am
<a href="#">Veterinary Medical Library</a>	8:00 am to 12:00 am

[Fall and Spring Hours 2011-2012](#)

[Breaks & Special Hours 2011-12](#)

[Dead Week and Finals Fall 2012 Hours](#)

[Dead Week and Finals Spring 2012 Hours](#)

## SELECT A LIBRARY

Archives & Special Collections	10AM - 4:30PM
Aviation Technology	8AM - 7PM
Black Cultural Center	8AM - 5PM
Chemistry Library	8AM - 10PM
Earth & Atmospheric Sciences Library	8AM - 7PM
Engineering Library	8AM - Mid
Hicks Repository	8AM - Mid
HSSE Library	8AM - Mid
Life Sciences	8AM - 7PM
Management & Economics	8AM - 5PM
Mathematical Sciences	8AM - 10PM
Pharmacy, Nursing, and Health Sciences	8AM - 10PM
Physics	8AM - 10PM
John W. Hicks Undergraduate Library	8AM - 10PM
Veterinary Medical Library	8AM - 10PM

# Purdue Library Website

## Hours

Users want more hours information than present day

Inefficient drop down list shown by mouse hover



Simple table works

# Purdue Library Website

## Hours

### List of All Hours

Fall 2015	Thanksgiving 2015	Prep and Finals Weeks Fall 2015	Winter Break Dec 2015	Winter Break Jan 2016
Spring 2016	Spring Break 2016			

#### Fall Semester Hours 2015

LIBRARY	MONDAY - THURSDAY	FRIDAY	SATURDAY	SUNDAY
<u>Archives &amp; Special Collections</u>	10 AM - 4:30 PM	10 AM - 4:30 PM	Closed	Closed
<u>Aviation Technology</u>	8 AM - 7 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 5 PM
<u>Black Cultural Center</u>	8 AM - 9:30 PM	8 AM - 6 PM	Closed	6 PM - 9 PM
<u>Chemistry</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Earth, Atmospheric &amp; Planetary Sciences</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Engineering</u>	8 AM - Midnight	8 AM - 6 PM	11 AM - 5 PM	11 AM - Midnight
<u>Hicks Undergraduate *</u>	7 AM - Midnight	7 AM - 6 PM	1 PM - 6 PM	1 PM - Midnight
	Open 24 Hours with PUID card swipe	Open 24 Hours with PUID card swipe	Open 24 Hours with PUID card swipe	Open 24 Hours with PUID card swipe
<u>Humanities, Social Science &amp; Education</u>	7 AM - Midnight	7 AM - 6 PM	11 AM - 5 PM	1 PM - Midnight
<u>Life Sciences</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Mathematical Sciences</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Parrish Library of Management &amp; Economics ****</u>	Open 24 Hours	Close at 8 PM	10:30AM - 4:30PM	Open at 11 AM
	Building locks at midnight			Building locks at midnight
<u>Pharmacy, Nursing &amp; Health Sciences</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Physics</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
			Closed 11/21 due to power outage	
<u>Veterinary Medical</u>	8 AM - 10 PM	8 AM - 5 PM	1 PM - 5 PM	1 PM - 10 PM
<u>Interlibrary Loan</u>	8 AM - 7 PM	8 AM - 6 PM	Closed	Closed

# Purdue Library Website

## Discover Tool



Too many search results



Databases are different

Discovery deficit

Duplicated search results



Inconsistent access options

## Solution:

Unified search for all library resources

Facets

“Find Online”, “Find in Print”

Virtual Bookshelf



# Purdue Library Website

## Discovery Tool

**PURDUE LIBRARIES**  
UNIVERSITY

You are viewing a *redesigned* Purdue Libraries Search. [Give us your Feedback »](#)

[Online Journals](#) | [Databases A-Z](#) | [Citation Linker](#) | [Ask a Librarian](#) | **Guest** | [e-Shelf](#) | [My Account](#) | [Sign In \[Purdue | Visitors\]](#)

Everything | Course Reserves

google

Search

Advanced Search | Browse Books and Media

Didn't find the book? Try [UBorrow](#) or [Worldcat](#) Article? Try [Google Scholar](#)

Results 1 - 20 of 680 for **Books, Media, Journals & Digital**

Sorted by: Relevance

Sign in to see all search results

Show only

Full Text Online (469)

On Shelf (133)

Publication Date

From To Refine

18002015

Material Type

Books (507)

Articles (88)

Journals (59)

Dissertations (16)

Audio Visual (8)

Other (2)

Databases (1)

Select multiple

Subject


Author / Creator


Language


Library


Library Sublocations


☆ Add page results to e-Shelf


 **Google apps hacks**  
Philipp Lenssen 1977-2008  
● Online access available  
[Find Online](#) [Details](#) [Virtual Bookshelf](#)

 **Google Maps mashups with Google Mapplets**  
Michael J. Young 2008  
● Online access available. The library also has physical copies.  
[Find Online](#) [Find in Print](#) [Details](#) [Virtual Bookshelf](#)

 **Google Search Secrets**  
Christa. Burns ;Michael P Sauers 2013  
● Online access available  
[Find Online](#) [Details](#)

 **Getting started with Google Apps**  
Paul. Darbyshire ;Adam Darbyshire; Kunal Mittal 2010  
● Online access available  
[Find Online](#) [Details](#)

 **Google power search**  
Stephan M. Spencer 2011  
● Online access available  
[Find Online](#) [Details](#) [Virtual Bookshelf](#)

 **Google : the missing manual**

# Purdue Library Website

## Discovery Tool

### Iterative User Tests

User's own search:	The last search on library website
Open-ended search:	Find a journal article on <i>Supply Chain Management</i> published within the last 5 years
Close-ended search:	Find the book <i>Introduction to Algorithms</i> by Thomas H. Cormen

# Purdue Library Website

## Discovery Tool

### User Behavior Patterns:

Start with default search

Browse first page of search results

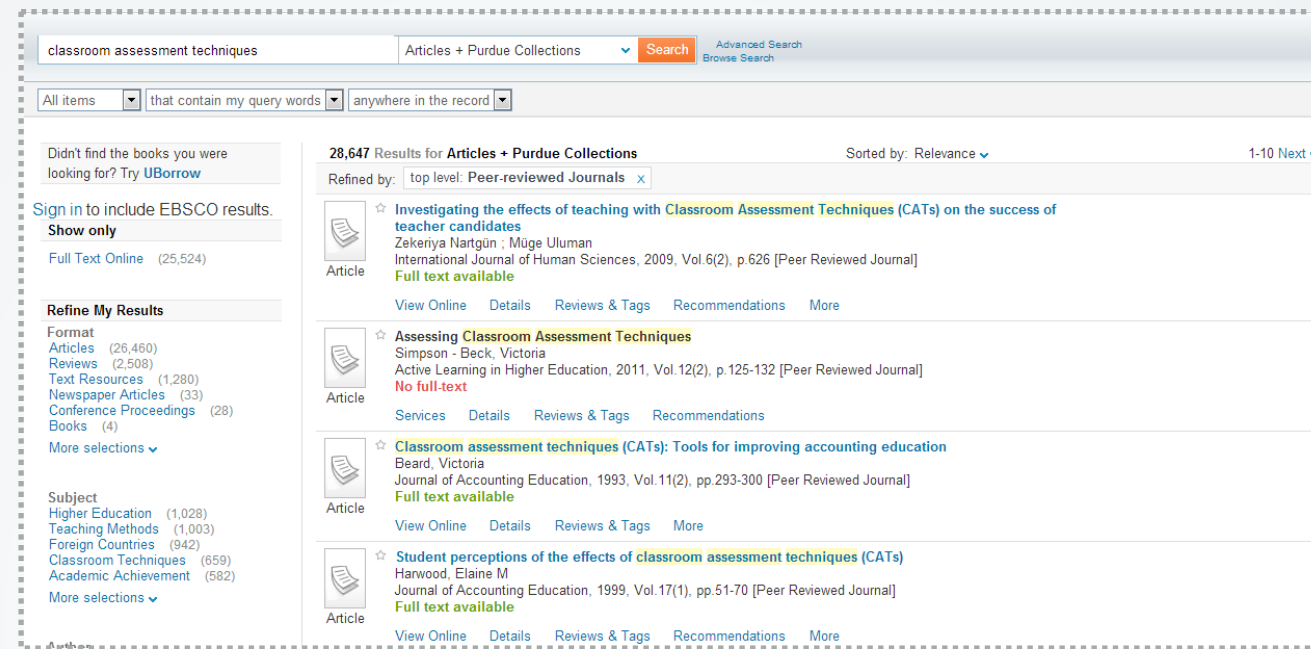
Low usage of facets

Reformulate keywords when not satisfied with results,  
not using facets

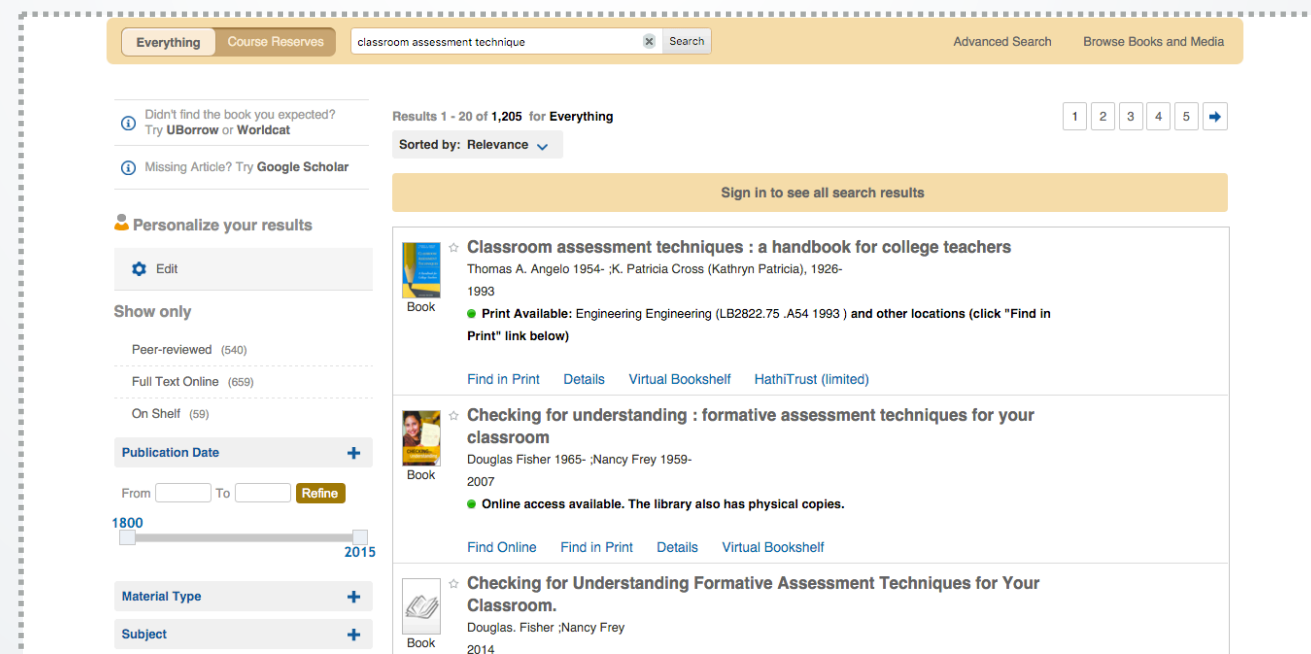
# Purdue Library Website

## Discovery Tool

Before



Now





# Purdue Library Website

## Discovery Tool

Before, facet usage = 9.7%

**Show only**  
[Peer-reviewed Journals](#) (15,279)  
[Full Text Online](#) (32,482)  
[Physical items available](#) (53)

**Refine My Results**

**Format**  
[Articles](#) (19,269)  
[Books](#) (13,192)  
[Newspaper Articles](#) (2,979)  
[Reviews](#) (2,924)  
[Text Resources](#) (631)  
[Audio Visual](#) (301)  
[Conference Proceedings](#) (123)  
[Scores](#) (11)  
[eBooks](#) (8)  
[Reference Entries](#) (7)  
[Other](#) (4)  
[Web Sites](#) (2)  
[More selections](#) ▼

**Library**  
[Humanities, Social Science and Education](#) (41)  
[Internet](#) (8)  
[Hicks Repository](#) (4)  
[Undergraduate](#) (3)  
[Black Cultural Center](#) (2)  
[More selections](#) ▼

**Subject**  
[Literature](#) (1,091)  
[Native Americans](#) (59)  
[American Indians](#) (34)  
[Mental Health](#) (29)  
[Public Health](#) (21)  
[More selections](#) ▼

**Author**  
[Chase, Josephine](#) (14)  
[Brave Heart, Maria Yellow Horse](#) (7)  
[Elkins, Jennifer](#) (5)

**Collection**  
[Literature Resource Center \(Gale\)](#) (6,568)  
[SciVerse ScienceDirect \(Elsevier\)](#) (2,231)  
[Arts & Sciences \(JSTOR\)](#) (1,966)  
[Health Reference Center Academic \(Gale\)](#) (1,695)  
[Godey's Lady's Book \(Accessible Archives\)](#) (1,605)  
[More selections](#) ▼

**Creation Date**  
[Before 1957](#) (5,810)  
[1957 To 1970](#) (398)  
[1971 To 1984](#) (1,128)  
[1985 To 1999](#) (4,311)  
[After 1999](#) (13,756)  
[More selections](#) ▼


**Language**  
[English](#) (26,940)  
[French](#) (64)  
[German](#) (43)  
[Spanish](#) (40)  
[Finnish](#) (9)  
[More selections](#) ▼

**Classification LCC**  
[P - Language and literature.](#) (22)  
[E - History: America](#) (9)  
[M - Music.](#) (5)  
[R - Medicine.](#) (4)  
[D - History \(general\) and history of europe.](#) (2)  
[More selections](#) ▼

**Journal Title**  
[American Journal of Community Psychology](#) (7)  
[American Journal Of Public Health](#) (2)  
[Canadian Nurse](#) (2)  
[Children And Youth Services Review](#) (4)  
[Christian Recorder](#) (506)  
[More selections](#) ▼

Now, facet usage = 19.5%

**Show only**  
[Peer-reviewed](#) (35,803)  
[Full Text Online](#) (63,078)  
[On Shelf](#) (548)

**Publication Date** +  
From  To  [Refine](#)  
1  2015

**Material Type** +

**Subject** +

**Author / Creator** +

**Journal Title** +

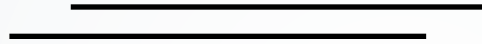
**Language** +

**Citation Source** +

**Library** +

**Library Sublocations** +

**Questions?**



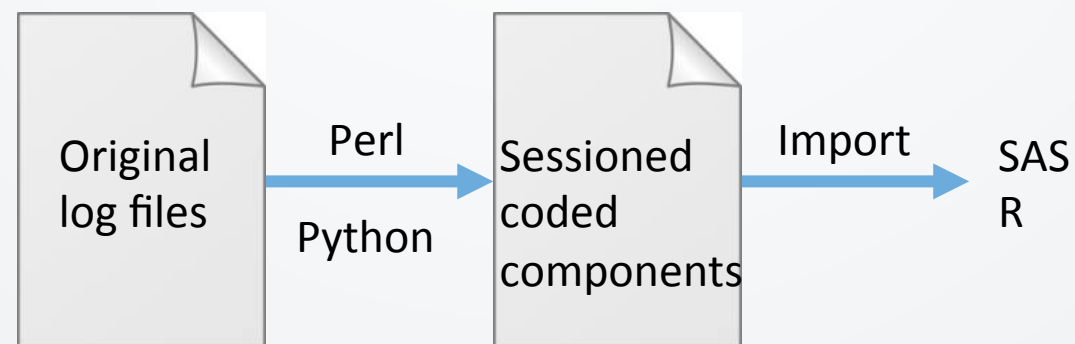
# Data Analytics

## HTTP Log Analysis

```
50.117.41.253 - - [01/Sep/2014:00:08:46 -0400] "GET /primo_library/  
libweb/action/dlSearch.do?  
institution=PURDUE&vid=PURDUE&indx=1&bulkSize=20&search_scope=everythi  
ng&highlight=true&query=any,contains,hard+time+for+soft+balancing  
HTTP/1.1" 200 45345 2373 03456FAEC7526F199BD42BEAE95030A5 -  
50.117.41.253
```

IP	Date & Time	Request URL	Status	Bytes Sent	Referring URL	User Agent
----	-------------	-------------	--------	------------	---------------	------------

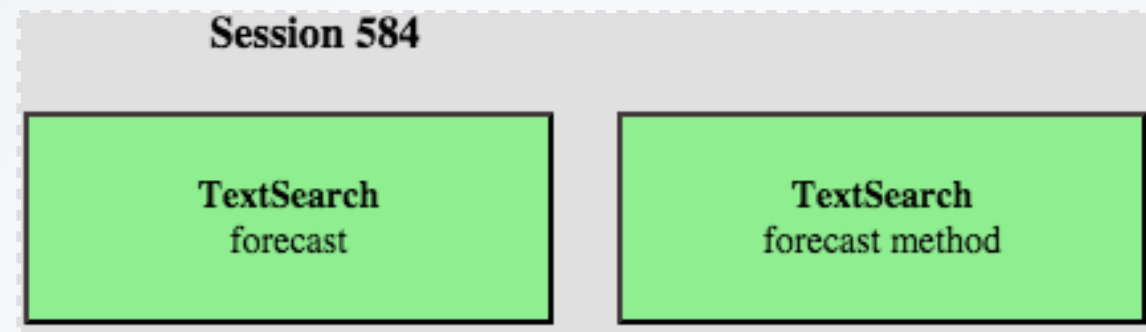
**Session ID**  
**Search field**  
**Query string**  
**Facets selected**



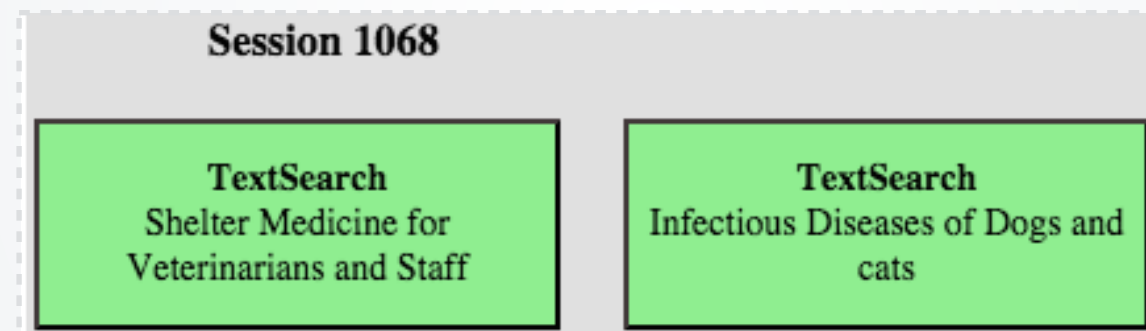
# Data Analytics

## Visualization of Query Reformulation

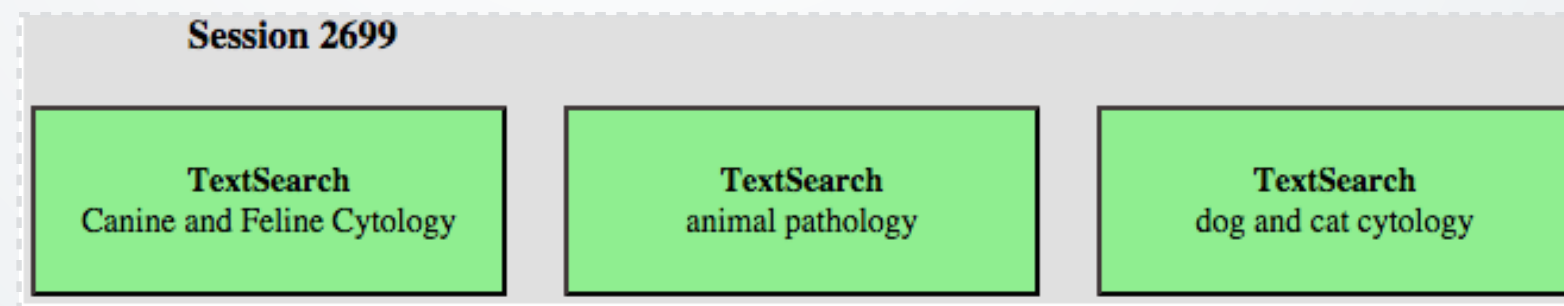
**Narrow:**



**Parallel:**



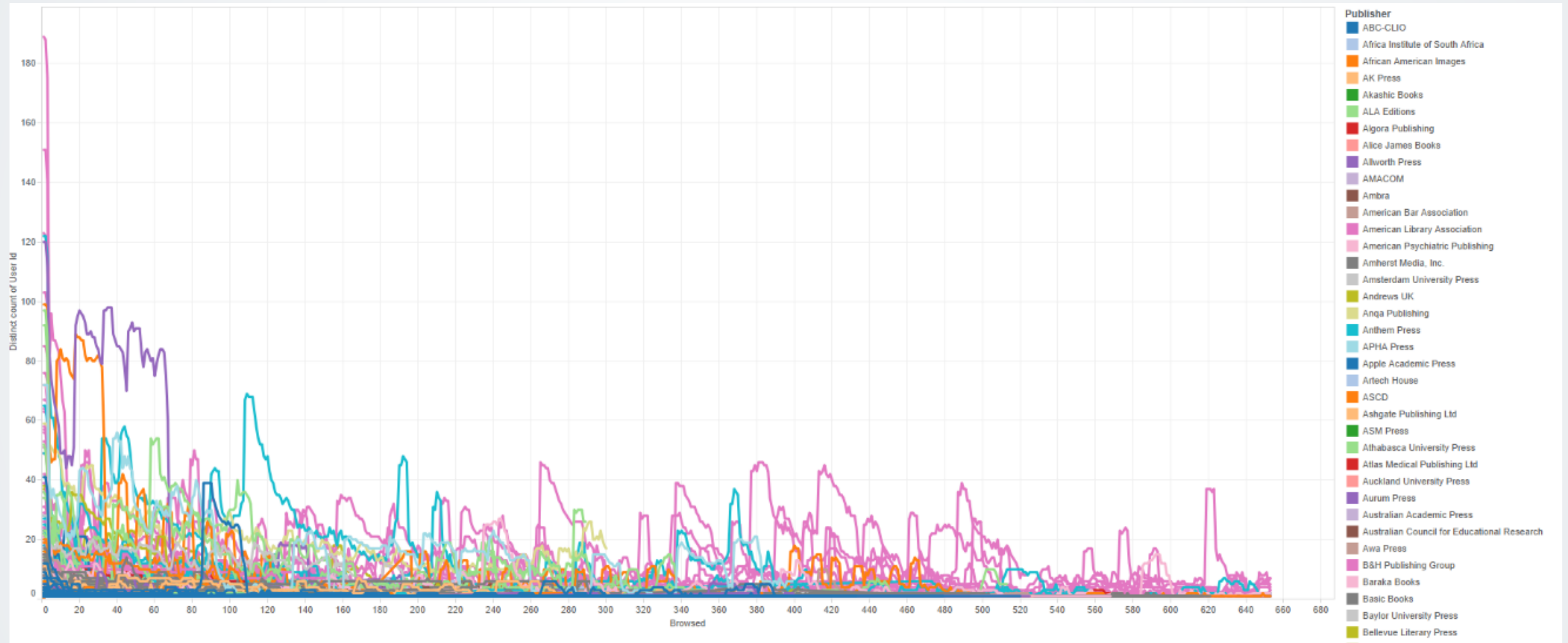
**Mixed:**





# Data Analytics

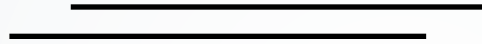
## E-Book Usage Visualization



**E-book page numbers browsed by users, grouped by publisher and subject.**

Tableau link: <https://goo.gl/EXij2l>

**Questions?**



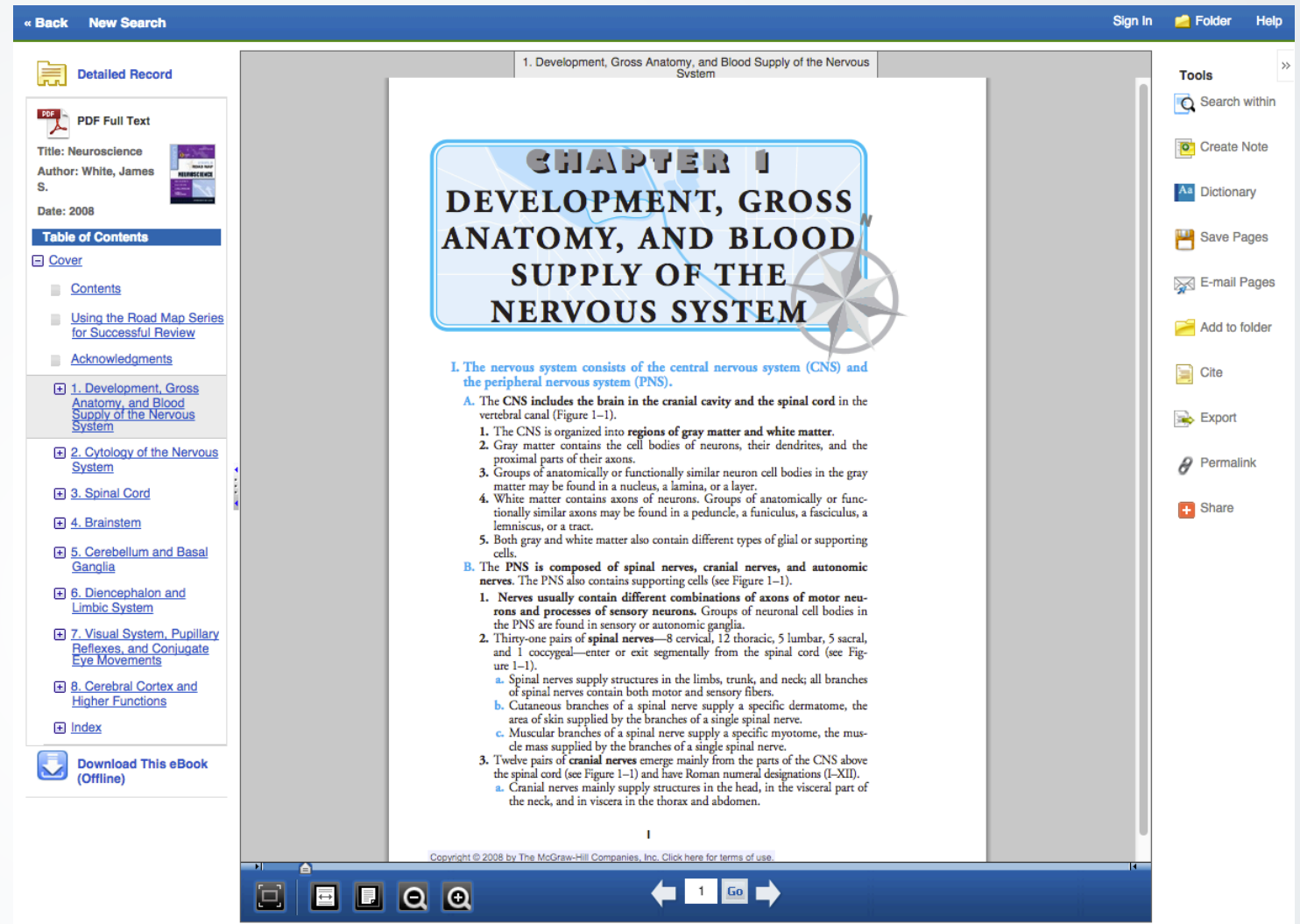
# E-Book Usability Test

## Project Background

- Sponsored by EBSCO
- E-books growing in libraries (1.5 million, 41.9% of Purdue total volumes)
- Actual user experience unknown

## Research Questions

- How do users find information in e-books?
- Does experience level matter?
- What are users' difficulties?



# E-Book Usability Test

## Test Design

### E-book reading: brief, fact searching

Of all e-book reading sessions:

69% < 10 minutes

92% < 30 minutes

80% < 30 pages

8% with download actions

### Information finding tasks:

In White's (2008) book on neuroscience, find the **definition** of "Ideational Apraxia".

Open Norris's book "Electoral Engineering: Voting Rules and Political Behavior" and find a **table** that lists the ideal functions of political institutions.

In Geismar's (2011) book "Identify Basic Principles of Identity Design in the Iconic Trademarks of Chermayeff & Geismar", find the **meaning** behind the Chase Manhattan Bank identity design in the 1960s.

.....



One-and-one lab test, post-test interview

12 participants: experts, intermediates, beginners



# E-Book Usability Test

## Results

### User behavior patterns:

- Rely on full text search
- Expect cross-references
- Scroll pages fast
- Scan for keywords

### Experience matters:

**Beginners:** search, click in text, scroll

**Experts:** index, table of contents, list of figures/tables

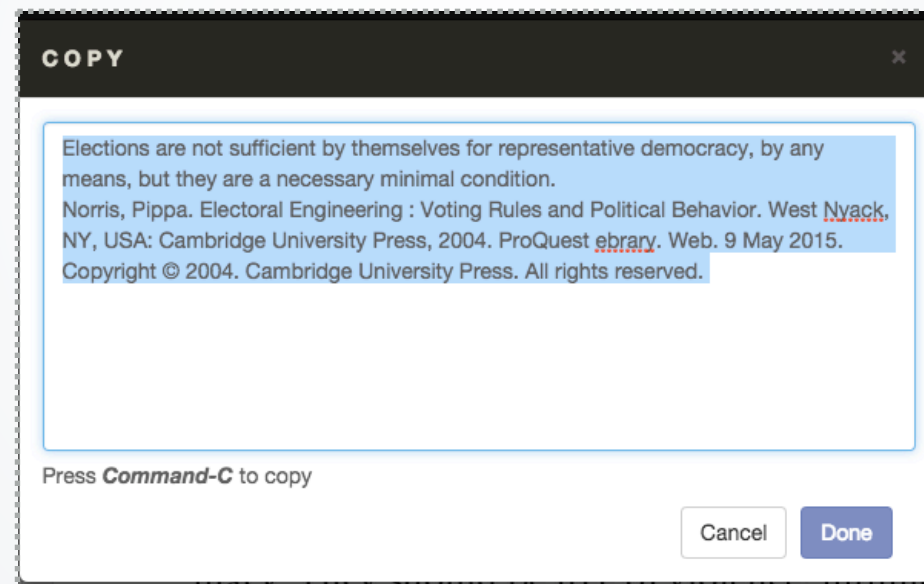
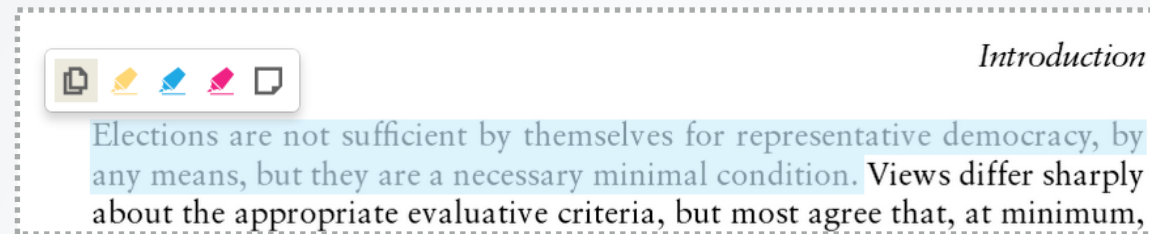
### Usability issues:

- Limited full text search
- Limited cross-references
- E-books designed for linear reading, not for scanning
- Single page view
- Scrolling not always supported
- Inconsistent annotation features
- Restrictions on print and download
- Discomfort of reading on screen

**Test video clip, search for a table in e-book: <https://goo.gl/XnCVJu>**

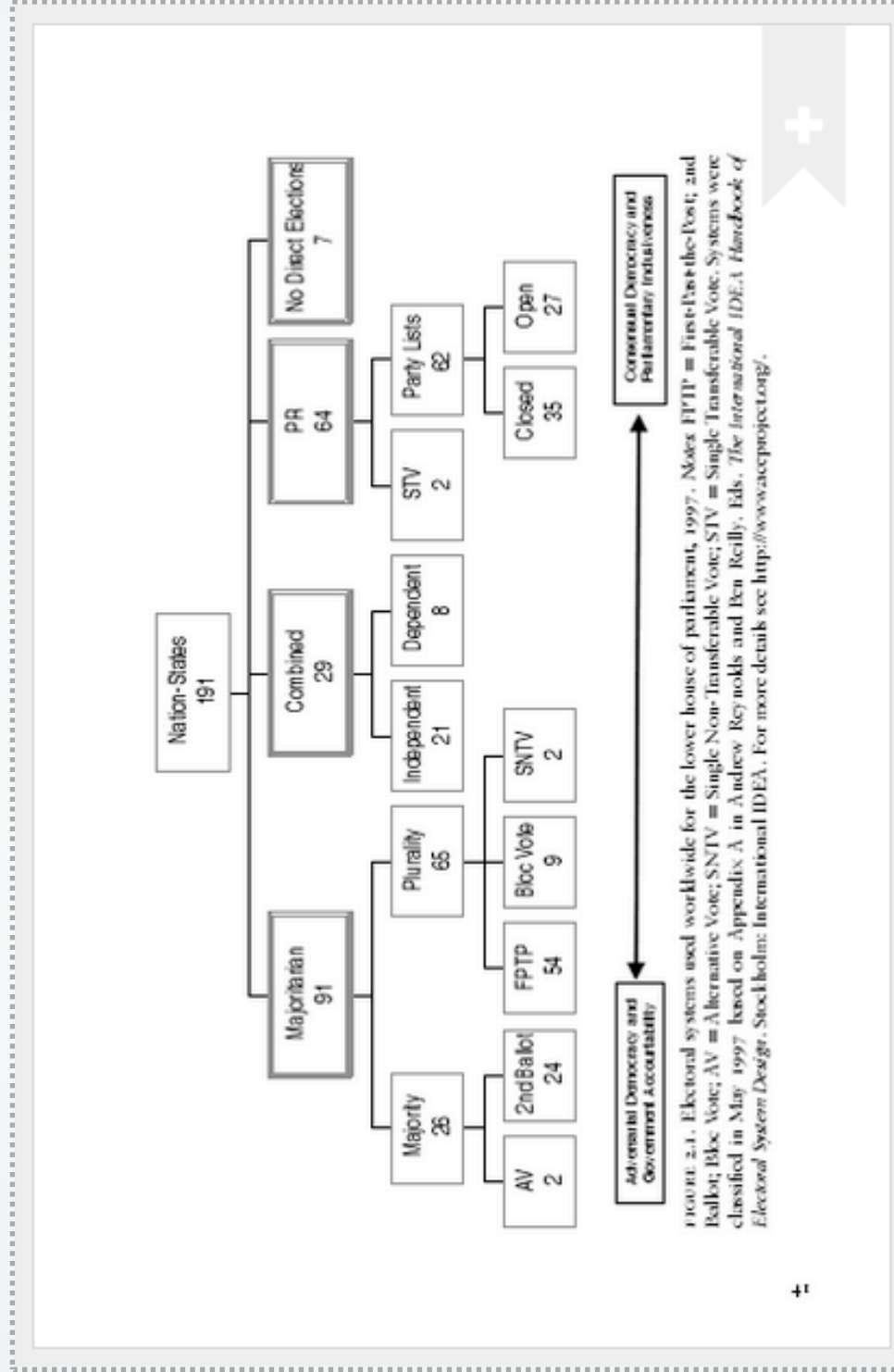
# E-Book Usability Test

## Usability Issue



# E-Book Usability Test

## Usability Issue



# E-Book Usability Test

## Impact

The screenshot displays an e-book interface. At the top, there is a navigation bar with links for « Back, New Search, Sign In, Folder, and Help. Below this, a secondary bar contains links for Contents, Search within, My Notes, and various actions like Add to folder, Save Pages, E-mail Pages, Cite, Dictionary, and a Download button. The main content area is divided into two panels. The left panel, titled « Neuroscience, shows a list of contents with the following items: Author: White, James S., Date: 2008, Detailed Record, Cover, Contents, Using the Road Map Series for Successful Review, Acknowledgments, 1. Development, Gross Anatomy, and Blood Supply of the Nervous System (highlighted), 2. Cytology of the Nervous System, 3. Spinal Cord, 4. Brainstem, 5. Cerebellum and Basal Ganglia, 6. Diencephalon and Limbic System, 7. Visual System, Pupillary Reflexes, and Conjugate Eye Movements, 8. Cerebral Cortex and Higher Functions, and Index. The right panel displays the first chapter, CHAPTER 1: DEVELOPMENT, GROSS ANATOMY, AND BLOOD SUPPLY OF THE NERVOUS SYSTEM. The chapter text includes an introduction and a list of topics: 1. The nervous system consists of the central nervous system (CNS) and the peripheral nervous system (PNS), 2. The CNS includes the brain in the cranial cavity and the spinal cord in the vertebral canal (Figure 1-1), 3. The PNS is composed of spinal nerves, cranial nerves, and autonomic nerves. The PNS also contains supporting cells (see Figure 1-1). The chapter concludes with a copyright notice: Copyright © 2008 by The McGraw-Hill Companies, Inc. Click here for terms of use.

- Test report communicated to EBSCO
- Changes made to EBSCO e-book interface

# Collaborators



**SAMSUNG**



# Thanks for viewing

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