SKILL BUILDING FOR EFFECTIVE USE OF MULTIDIMENSIONAL MEASUREMENTS IN COLLECTION ASSESSMENT

ALCTS Exchange – Pop-out-of-the-Box Session

Presented by
Karen Harker, MLS, MPH
Janette Klein, MLS, PhD Candidate
SESSION PRESENTERS

Karen Harker, MLS, MPH
Collections Assessment Librarian
University of North Texas

Janette Klein, MLS, PhD Candidate
Graduate Research Assistant
University of North Texas
SESSION OBJECTIVES

• Understand the limitations of conventional one-dimensional collection analysis measures

• Learn how to calculate key collection measurement ratios

• Identify collection discrepancies and areas of opportunity using ratios
THE ROLE OF ANALYSIS IN COLLECTION ASSESSMENTS

Opportunity cost
• “The true cost of an item acquired for a library’s collections is the opportunity cost of the items, which is to say, the value to the library’s clients of what was not acquired because the acquired item was chosen instead” (Carrigan, 1996, p. 274)
ONE DIMENSIONAL MEASUREMENTS

• Advantages
  • Simple generation
  • Easy sorting
  • One number

• Limitations
  • By themselves are meaningless
  • Lack of context
  • Lacks a comparison
MULTIDIMENSIONAL MEASUREMENTS

• What are they?
  • One measure plotted against one or more measures

<table>
<thead>
<tr>
<th>Category</th>
<th>Holdings</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts &amp; Humanities</td>
<td></td>
<td>Subject</td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td>Patron Type</td>
</tr>
<tr>
<td>Education &amp; Info</td>
<td></td>
<td>Format</td>
</tr>
<tr>
<td>Interdisciplinary</td>
<td></td>
<td>Year</td>
</tr>
<tr>
<td>Social Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Holdings
- Checkouts
- Purchases
- Loans
- Year
RATIOS – THE UNTOLD STORY

• What are ratios?
  • Efficient measures of effectiveness
  • Quantitative relation between two values
    • May or may not be of the same set.
    • May or may not be of the same unit of measure.
RATIOS – THE UNTOLD STORY

A ratio is the quantitative comparison of a dependent factor against an independent factor.

Dependent factor
Independent factor

Dependent factor – numerator
Can be thought of as “that which you don’t know”

Independent factor – denominator
Can be thought of as “action based”
EXPRESSION OF RATIOS

Common forms of expression:

• Fraction: 4/5
• Decimal: 0.8
• Percentage: 80%

  • Percentage is a special type of ratio.
  • Where the numerator is a subset of the denominator.
GENERAL LIFE EXAMPLES

Knowingly or not…ratios are used every day

- Miles per gallon (MPG)
- Cost per ounce/pound
- Price per gallon
CALCULATION OF RATIOS – POLL #1 & #2

• Calculate Miles per Gallon
  Miles Traveled: 367
  Gallons Needed to Refuel: 12
  \[
  \frac{367 \text{ miles traveled}}{12 \text{ gallons to refuel}} = 30.58 \text{ MPG}
  \]

• Calculate Cost per Use
  Cost of New Book: $500
  Number of Uses in 12 month period: 12
  \[
  \frac{$500 \text{ new book cost}}{12 \text{ uses}} = $41.67 \text{ cost per use}
  \]
What message are you trying to share with your audience?
PERCENTAGES AS RATIOS

Percentages are a specific kind of ratio calculations

- Numerator must be *subset* of the denominator
- Other ratios do not require this e.g. MGP, cost per use etc.

Components needed to calculate percentage of holdings

**Collection specific holdings** \(\div\) **Total of all holdings** = **% of holdings**

- **Music holdings**
  - \(\frac{207,649}{2,479,678} = 8.37\%\)

- **Economics holdings**
  - \(\frac{44,696}{2,479,678} = 1.80\%\)
PERCENTAGE EXERCISES – POLL #3 & #4

• Calculate Percentage of Music Enrollment
  Total Enrollment: 418,201
  Music Enrollment: 17,216

  \[
  \frac{17,216}{418,201} = 4.12\%
  \]

• Calculate Percentage of Music Circulation
  Total Circulation: 2,479,678
  Music Circulation: 207,649

  \[
  \frac{207,649}{2,479,678} = 8.37\%
  \]
APPLICATION OF RATIOS IN LIBRARY ASSESSMENT

• To demonstrate value:
  • Efficient use of resources
  • Effectiveness in meeting client needs
  • Value to the institution

• Culture of assessment via research as a method to meet user needs

• Assist in determining the ‘quality’ of a collection
STORYTELLING WITH RATIOS...

*Each type of ratio tells a story. It is up to you to determine the story that you wish to be told.*

What questions are you asking of the collection?

- What are the real or anticipated needs?
- In what ways are the collections being used?
- In what ways do we meet the needs of our faculty/students/stakeholders?
- How well do we meet those needs?

Ratios that could help answer these questions

- Percentage of enrollment of a college.
- Percentage of checkouts by format.
- Percentage of checkouts by patron group.
- Ratio of borrowings to holdings.
RATIOS OF RATIOS

• Taking this to the next level
• Compound ratios
  • 4 dimensions into 1
# Checkouts

## Holdings

<table>
<thead>
<tr>
<th># Checkouts</th>
<th># Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>63,601</td>
<td>141,796</td>
</tr>
</tbody>
</table>

\[ \frac{63,601}{141,796} = 0.4485 \]
DEMONSTRATION OF COMPOUND RATIOS

• **Comparisons** of ratios
  • % of checkouts by % of holdings
    • 5% of checkouts = 1.67
      3% of holdings
  • % of checkouts by % of enrollment
    • 5% of checkouts = 0.71
      7% of enrollment
REDUCING 4 MEASURES INTO 1

• Reducing 4 measures to 1:
  • Ratio of checkouts to holdings:
    1. # of checkouts in subject
    2. Total # of checkouts
    3. # of holdings
    4. Total # of holdings

• Provides context and comparison
  • By itself can have meaning…
WHAT THESE RATIOS MEAN

Zero to One
Numerator < Denominator
% Holdings < % Enrollment

Around One
About the same or equal
The percentages are close

Greater than One
Numerator > Denominator
% Holdings > % Enrollment
ANALYZING COLLECTIONS BY SUBJECT

• Collections are organized by subject.
  • Classification
  • Subject heading
  • Fund

• Analysis mirrors organization

• UNT Libraries:
  • OCLC Conspectus subject divisions by LoC Classification

• Limitations
  • Interdisciplinarity
  • Different ways to organize: DDC, LCC, LCSH, subject categories
  • Mutually-exclusive or overlapping?
SUBJECT-BASED COLLECTION RATIOS

Use Factor (UF)

- Disparity between circulation & holdings - Bonn (1974)

Ratio of Borrowings to Holdings (RBH)

- Included borrowing - Aguilar (1986)

Holdings Factor (HF)

- Holdings compared to enrollment
<table>
<thead>
<tr>
<th>Category</th>
<th>Collection</th>
<th>% of Checkouts</th>
<th>% of Enrollme..</th>
<th>% of Holdings</th>
<th>% of ILL Reque..</th>
<th>Holdings Factor</th>
<th>Use Factor</th>
<th>RBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts &amp; Humanities</td>
<td>Interdisciplinary Arts</td>
<td>7.66%</td>
<td>0.26%</td>
<td>10.18%</td>
<td>5.87%</td>
<td>38.85</td>
<td>0.75</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>Philosophy &amp; Religion S..</td>
<td>1.59%</td>
<td>0.33%</td>
<td>1.92%</td>
<td>2.52%</td>
<td>5.92</td>
<td>0.82</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>History</td>
<td>4.52%</td>
<td>1.56%</td>
<td>6.41%</td>
<td>7.29%</td>
<td>4.12</td>
<td>0.71</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>4.97%</td>
<td>2.12%</td>
<td>7.22%</td>
<td>4.84%</td>
<td>3.41</td>
<td>0.69</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>World Languages, Liter..</td>
<td>1.54%</td>
<td>0.66%</td>
<td>1.86%</td>
<td>1.60%</td>
<td>2.80</td>
<td>0.83</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>Music</td>
<td>8.92%</td>
<td>4.12%</td>
<td>9.45%</td>
<td>4.48%</td>
<td>2.29</td>
<td>0.94</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>Art Education/Art Hist..</td>
<td>4.12%</td>
<td>0.92%</td>
<td>2.00%</td>
<td>2.49%</td>
<td>2.17</td>
<td>2.06</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>Studio Art</td>
<td>3.12%</td>
<td>1.98%</td>
<td>3.02%</td>
<td>3.44%</td>
<td>1.53</td>
<td>1.03</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td>Theatre</td>
<td>0.70%</td>
<td>0.48%</td>
<td>0.53%</td>
<td>0.58%</td>
<td>1.10</td>
<td>1.33</td>
<td>1.09</td>
</tr>
<tr>
<td></td>
<td>Design</td>
<td>1.11%</td>
<td>2.01%</td>
<td>0.91%</td>
<td>0.74%</td>
<td>0.45</td>
<td>1.23</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Dance</td>
<td>0.05%</td>
<td>0.22%</td>
<td>0.08%</td>
<td>0.13%</td>
<td>0.34</td>
<td>0.71</td>
<td>1.77</td>
</tr>
<tr>
<td></td>
<td>News Journalism</td>
<td>1.46%</td>
<td>3.04%</td>
<td>1.02%</td>
<td>0.84%</td>
<td>0.34</td>
<td>1.43</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Media Arts</td>
<td>1.38%</td>
<td>2.91%</td>
<td>0.59%</td>
<td>0.51%</td>
<td>0.20</td>
<td>2.35</td>
<td>0.87</td>
</tr>
</tbody>
</table>
### UNDERSTANDING COLLECTIONS RATIOS

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Very Low</th>
<th>Around one</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Holdings Factor</strong></td>
<td>Holdings much less than expected need</td>
<td>“Balanced” – at least, based on enrollment</td>
<td>Holdings much greater than expected need</td>
</tr>
<tr>
<td><strong>Use Factor</strong></td>
<td>Use much lower than expected.</td>
<td>Use about expected</td>
<td>Use much greater than expected</td>
</tr>
<tr>
<td><strong>Ratio of Borrowings to Holdings</strong></td>
<td>ILL requests much fewer than expected</td>
<td>ILL requests similar to holdings</td>
<td>Much more ILL requests than expected</td>
</tr>
</tbody>
</table>
APPLYING COLLECTION RATIOS

Holdings Factor (HF) =
% of Holdings / % of Enrollment

History Holdings of 6.41%
Total Enrollment of 1.56% = 4.1

• Estimation is 6:1.5 about 4:1 or about 4
• The facts: low enrollment, high holdings, ratio of more than 1

• What conclusions can be drawn from this data?
• Potential remedies for this imbalance?
WHAT HAPPENS IF...TOP NUMBER INCREASES? – POLL #5

Scenario 1: Holdings Factor (HF)

Original holdings: \(\frac{4.50}{1.93}\) or \(4.50:1.93 = 2.33\)

Numerator by 2 and denominator remains constant. Ratio impact?

Increased holdings: \(\frac{6.50}{1.93}\) or \(6.50:1.93 = 3.37\)

*Take home message:*

If numerator > denominator, ratio >1. When the numerator increases, the ratio will increase.
WHAT HAPPENS IF...BOTTOM NUMBER INCREASES? – POLL #6

Scenario 2: Use Factor (UF)

Original ratio: \( \frac{1.19}{1.17} \) or \( 1.19:1.17 = 1.02 \)

Denominator increased by 2 but the numerator remains constant. Ratio impact?

Revised ratio: \( \frac{1.19}{3.17} \) or \( 1.19:3.17 = 0.38 \)

*Take home message:*

*If numerator < denominator, ratio < 1.*

*When the denominator increases, the ratio will decrease.*
“The worth of a library cannot be measured by the quantity of its resources alone. The quality of those resources, proven by use, is the ultimate worth of a library” (Ochola, 2002, p. 12)
QUESTIONS?

• Karen Harker – UNT Collections Assessment Librarian
  Karen.Harker@unt.edu

• Janette Klein – UNT Libraries Graduate Research Assistant
  Janette.Klein@unt.edu
REFERENCES

