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Federated Searching: Do Undergraduates Prefer it and Does it Add Value?

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Federated Searching

Do Undergraduates Prefer it and Does it Add Value?

C. Jeffrey Belliston
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Brigham Young University

ACRL 13th National Conference
March 31, 2007
Poll: Institution Type - Highest Degree Offered

A. Associate
B. Bachelor’s
C. Master’s
D. Doctorate
Poll: Institution Size - Enrollment

A. Under 1,000
B. 1,000 – 4,999
C. 5,000 – 14,999
D. 15,000 – 24,999
E. 25,000 or more
Poll: Federated Searching Experience

A. Considering implementing
B. Actively planning for implementation
C. Implementing or pilot project
D. Fully implemented – less than happy with
E. Fully implemented – happy with
Study Background 1

- Consortium of Church Libraries and Archives (CCLA)
  - Five academic and several special libraries
- All academic institutions interested
  - Competition with Google
  - Desire to promote scholarly subscription resources in an effective way
  - Expose less-used content to greater use
Study Background 2

- **Before implementation**
  - Demos from leading vendors for CCLA libraries
  - Discussion and input from library staffs
    - “Let technology mature”
    - “Opt for leading edge not bleeding edge”
- **CCLA Directors decided to license**
  - Initial 3 year agreement (expires 2007)
  - Actual implementation left under local control
Study Background 3

- Impetus for study came from impending renewal
  - Is federated searching doing what we hoped it would?

- Four questions
  - Does federated searching save time?
  - Does federated search satisfy students' information needs?
  - Do students prefer federated search to the alternative of searching databases individually?
  - Does federated searching yield quality results?
Study Methodology - Preparation 1

- Hoped to do at all four institutions
  - Received IRB approval at all four
  - Dropped LDS Business College due to poor response
- E-mailed potential undergraduate participants
- Decided upon hypothetical research questions (both biology)
- With faculty and librarian help, created subjective grading rubric
Study Methodology - Preparation 2

• With vendor help, designed implementation-neutral web interface
  - Did not want study interface to look like any of the institutional interfaces
• Wrote and tested instructions for data collection
• Printed instructions and questionnaires
• Scheduled rooms and respondent appointments
  - Suggested 30–60 minutes as typical timeframe
  - Provided, on our end, a minimum of two hours to complete
Study Methodology - Data Collection 1

- Seated student at computer already on main Web page for study
- Provided consent form and asked for signature
- Provided written general instruction sheet
Directions - Forms 1-F and 2-F

- During this study you will be asked to conduct the research necessary to complete the research portion of 2 hypothetical research papers assignments:
  - You will conduct the research for the first assignment by searching multiple databases simultaneously. You will not be able to change the selection of databases.
  - You will conduct the research for the second assignment by searching databases individually. You may search as few or as many of the available databases as you choose.

- Use only the books that will be provided to you on the computer screens to conduct the research necessary to complete these assignments:
  - Do not consult Google or any outside resources, such as the library catalog or a database on or outside the Bates College campus.

- For your information, the "Scratch Pad" of Google Desktop appears on the screen to the right of the Web browser. You will copy citations from the "Scratch Pad" as instructed below.

- Take as much time as you need to complete a list of enough citations to your journal articles to complete each hypothetical assignment to write a 10-page research paper. The citations will be credited as you see them on screen. They do not have to be in a particular format such as APA, MLA, Turabian, etc.
  - Do not include citations to blogs, videos, websites, etc.
  - A typical journal article citation looks something like this. (Some citations include an abstract or short summary such as this example. Others do not.)

Emphasis on journal articles and what meant by “citation”

How to copy from search results to Google Scratch pad

Brief explanation of what participant would be doing

Caution against use of other resources
Study Methodology - Data Collection 2

- Provided specific instruction sheet/questionnaire combo for 1st question/1st method combination
- Noted participant student login ID
- When ready to start, noted start time for 1st q/1st m
- When finished, noted end time for 1st q/1st m
- Copied citations from Google Scratch Pad to MS Word and saved with standard naming convention (loginid.1q1m.q#)
Hypothetical Research Assignment #1

You’ve been given an assignment to write a 10-page research paper on the topic outlined below: Ignoring any ethical issues involved, what is the current status of stem cell research for the treatment of diabetes?

Using only the resources available to you on screen when the study proctor tells you to begin, find enough citations to journal articles to enable you to complete this assignment. Copy the citations to the “Scratch Pad” on the right-hand side of your screen as shown on the “Directions” sheet.

If you lose your place
• press the Web browser’s home button
• click on the “Form 1-F” link
• click on the “Hypothetical Research Assignment #1” link

Stop

After you have compiled a list of enough citations to complete this hypothetical assignment, stop your work and notify the study proctor.

Hypothetical Research Assignment #2

You’ve been given an assignment to write a 10-page research paper on the topic outlined below: According to current research, what are the effects of agriculture on rainforests and biodiversity?

Using only the resources available to you on screen when the study proctor tells you to begin, find enough citations to journal articles to enable you to complete this assignment. Copy the citations to the “Scratch Pad” on the right-hand side of your screen as shown on the “Directions” sheet.

If you lose your place
• press the Web browser’s home button
• click on the “Form 1-F” link
• click on the “Hypothetical Research Assignment #2” link

Stop

After you have compiled a list of enough citations to complete this hypothetical assignment, stop your work and notify the study proctor.
Questionnaire

1. How satisfied were you with the citations you were able to discover using the first research method (Hypothetical Assignment #1)? (Circle One: 1=Unsatisfied to 7=Very satisfied)

   1 2 3 4 5 6 7

2. How satisfied were you with the citations you were able to discover using the second research method (Hypothetical Assignment #2)? (Circle One: 1=Unsatisfied to 7=Very satisfied)

   1 2 3 4 5 6 7

3. Which method did you prefer? (First)____ (Second)____

   Why?

4. What other comments do you have about your searching experiences?
Study Methodology - Data Collection 3

- Cleared Google Scratch Pad
- Repeated for 2nd q/2nd m
- Asked participant to complete questionnaire
- Thanked participant and gave incentive
- Copied MS Word documents from hard drive to flash drive
Study Methodology - Data Analysis 1

- Entered start/stop times and questionnaire data into MS Excel spreadsheet
- To get into standard format, entered data from each citation set into RefWorks
  - Created new folder for each citation set
  - Removed all non-journal article citations
  - Removed all duplicate citations
- Created master journal list
Study Methodology - Data Analysis 2

- For journals on master journal list
  - Gathered impact factors from ISI Journal Citation Reports
  - Gathered peer-reviewed data from Ulrichsweb.com
  - Recorded data in MS Excel worksheet
- Output each citation set into MS Word using RefWorks custom format
- Printed citation sets and gave to student grader
- Wrote macro for MS Word to parse data in RefWorks custom format into a csv format capable of import to MS Excel
Study Methodology - Data Analysis 3

- Imported csv file into MS Excel
- Wrote macros for Excel to
  - Assign impact factor and peer-review data to each citation
  - Calculate timeliness of each citation
  - Calculate for each citation set
    - Ratio of peer-reviewed to total citations
    - Average timeliness
    - Average impact factor
  - Insert data from objective analysis into master spreadsheet
- Entered grades from subjective grading rubric into master spreadsheet
Study Methodology - Data Analysis 4

- Used SAS to perform statistical analysis
Purpose Revisited

1: Does federated searching save time?
Poll: Time Savings

Does federated searching save time?

a. Yes

b. No
Time Saved Using Federated Search

2 minutes
23 seconds
Time Saved Using Federated Search

10.5% less time searching using federated search
## Time Saved Using Federated Search

<table>
<thead>
<tr>
<th>Institution</th>
<th>Time Saved</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYU</td>
<td>4 minutes 11 seconds</td>
<td>20.7%*</td>
</tr>
<tr>
<td>BYU Idaho</td>
<td>11 seconds</td>
<td>1.9%</td>
</tr>
<tr>
<td>BYU Hawaii</td>
<td>26 seconds</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

* Statistically Significant
Time Saved Using Federated Search

“[Federated search] definitely saved time and was more convenient to use than the [non–federated search].”

--BYU Undergraduate (emphasis added)
Purpose Revisited

2:

Does federated search satisfy students' information needs?

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Poll: Satisfaction

How satisfied do you think the undergraduates were with the results found using federated search?

1 = Unsatisfied to 7 = Very satisfied

a. <3
b. Between 3 and 4
c. Between 4 and 5
d. Between 5 and 6
e. Between 6 and 7
Poll: Satisfaction

How **satisfied** do you think the undergraduates were with the results found using **non-federated** searching?

1 = Unsatisfied to 7 = Very satisfied

a. < 3
b. Between 3 and 4
c. Between 4 and 5
d. Between 5 and 6
e. Between 6 and 7
Federated Search Satisfaction Rating

5.59
Non-federated Search Satisfaction Rating

4.8
Satisfaction

16.5% more satisfied with federated search
## Satisfaction Using Federated Search

<table>
<thead>
<tr>
<th>Institution</th>
<th>More satisfaction</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYU</td>
<td>0.99</td>
<td>20.7%*</td>
</tr>
<tr>
<td>BYU Idaho</td>
<td>-0.07</td>
<td>-1.3%</td>
</tr>
<tr>
<td>BYU Hawaii</td>
<td>1.44</td>
<td>34.9%*</td>
</tr>
</tbody>
</table>

* Statistically Significant
Satisfaction Using Federated Search

“I found that both were not very user friendly...I was frustrated and very tempted to just go back to good old ‘Google’!!”

--BYU Hawaii Undergraduate (emphasis added)
3: Do students prefer federated search to the alternative of searching databases individually?
Poll: Preference

Do students prefer federated search to the alternative of searching databases individually?

a. Yes
b. No
Federated Search Preference

70% of the students preferred federated search over non-federated search.
## Federated Search Preference

<table>
<thead>
<tr>
<th>Institution</th>
<th>% Preferred Federated Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYU</td>
<td>72%</td>
</tr>
<tr>
<td>BYU Idaho</td>
<td>52%</td>
</tr>
<tr>
<td>BYU Hawaii</td>
<td>81%</td>
</tr>
</tbody>
</table>
Federated Search Preference

“...[Federated search] got right to the point. I found more useful information. [With the non-federated search] I had to do a longer search.”

--BYU Idaho Undergraduate (emphasis added)
4:

Does federated searching yield quality results?
Poll: Quality of Results

Does federated searching yield higher quality results than non-federated searching?

a. Yes
b. No
c. Same quality regardless of search technique
Federated Search Preference

Ambiguous results for quality of citations found using federated searching versus non-federated searching
## Quality of Results

<table>
<thead>
<tr>
<th></th>
<th>% change in quality between federated and non-federated results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Librarian-created rubric</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>−5.6%*</td>
</tr>
</tbody>
</table>

* Statistically Significant
## Quality of Results

<table>
<thead>
<tr>
<th>Institution</th>
<th>Librarian-created rubric</th>
<th>Faculty-created rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYU</td>
<td>-5.7%</td>
<td>-2.5%</td>
</tr>
<tr>
<td>BYU Idaho</td>
<td>-2.3%</td>
<td>10.2%</td>
</tr>
<tr>
<td>BYU Hawaii</td>
<td>-8.5%</td>
<td>-2.6%</td>
</tr>
</tbody>
</table>

% change in quality between federated and non-federated results.
Quality of Results

“I love Google, but this certainly helps to narrow your information down to ‘good’ resources.”

--BYU Hawaii Undergraduate (emphasis added)
Conclusions

1: Federated searching *saves time*
Conclusions

2: Federated searching satisfies undergraduate’s information needs
Conclusions

3:

Undergraduates prefer federated search to searching databases individually
Conclusions

4:

There is no clear difference between the quality of results found using federated search and searching databases individually.
Future Research

**Extrapolate results beyond BYU, BYU Hawaii and BYU Idaho**
Future Research

Extrapolate results beyond undergraduate population
Future Research

Study the effects of specific federated search implementations
Questions
# Actual Numbers

<table>
<thead>
<tr>
<th></th>
<th>Number of Participants</th>
<th>% Preferred Federated</th>
<th>Average Time to Complete Research (in minutes)</th>
<th>Satisfaction of Results – Average Rating (Scale of 1-7; 7 being highest)</th>
<th>Librarian-created Rubric – Average Quality Scores (Scale of 0-30; 30 being highest)</th>
<th>Faculty-created Rubric – Average Quality Scores (Scale of 0-9; 9 being highest)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Federated</td>
<td>Non-federated</td>
<td>Federated</td>
<td>Non-federated</td>
</tr>
<tr>
<td>BYUH</td>
<td>27</td>
<td>81%</td>
<td>21.17</td>
<td>22.14</td>
<td>5.57</td>
<td>4.13&lt;sup&gt;1,2&lt;/sup&gt;</td>
</tr>
<tr>
<td>BYUI</td>
<td>21</td>
<td>52%</td>
<td>23.10</td>
<td>23.54</td>
<td>5.41&lt;sup&gt;1&lt;/sup&gt;</td>
<td>5.48</td>
</tr>
<tr>
<td>BYU</td>
<td>47</td>
<td>72%</td>
<td>16.76&lt;sup&gt;1&lt;/sup&gt;</td>
<td>21.14&lt;sup&gt;2&lt;/sup&gt;</td>
<td>5.77</td>
<td>4.78&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>ALL</td>
<td>95</td>
<td>70%</td>
<td>20.34</td>
<td>22.72</td>
<td>5.59&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4.80&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

1. Statistically significant difference between schools ($\alpha = .05$)
2. Statistically significant difference between methods ($\alpha = .05$)
3. Marginally significant difference between schools ($\alpha = .10$)
4. Marginally significant difference between methods ($\alpha = .10$)
5. These are adjusted means not pure means. A least squares mean was utilized to create more robust results due to differing sample sizes between the schools.
Least Squares Mean: The effect of any covariates is statistically removed from the scores prior to computing the means.