Factors that influence undergraduate information-seeking behavior and lead to success

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**Abstract**

From a survey we administered a survey to undergraduate students on their information seeking behavior, we identify variables that influence how students conduct their search for sources, what types of sources they select, and what attributes of their sources they value. These variables relate to both student demographics and actions that have been taken by instructors and library staff. With a more thorough understanding of students' information seeking process and its influences, we find opportunities for instructors and librarians to positively influence undergraduate information-seeking behavior.

*Keywords*: Information-seeking behavior; undergraduate students; library resources

**1 Introduction**

Convenience is found to be a primary factor that drives undergraduate information-seeking behavior, partially because resource evaluation is such a challenge for undergraduate students (Lee, H., 2008; Connaway et al., 2011; Taylor, 2012; Lee, J., 2012; Rempel, 2013). The volume of resources and complexity of library search tools lead many undergraduates to rely heavily on the familiar internet search engines for their information rather than on library subscription databases and electronic resources. Georgas (2014) found that students' search strategies reflected a limited grasp of how the search tools they were using fit into the larger information architecture. Georgas (2013) directly observed students conducting research and noted that when search tools took students to publisher interfaces hosting the library’s subscription journals, the students failed to understand what kind of interface they were in and what types of content they would find there. Despite these observations, when students were asked to evaluate themselves, they revealed that they believed they possessed excellent research skills (Georgas (2014) and Georgas (2015)).

As students progress in their academic careers, they do not necessarily develop better research habits. Mbabu et al. (2012) found that despite having higher levels of learning and the being expected to have more sophisticated research skills, juniors and seniors had used the university’s subscription databases proportionally less than freshmen and sophomores.Similarly, Callinan (2005) found that both first-year and final-year students struggled to use resources in the electronic environment and both groups indicated a desire to receive further instruction on finding journal articles in electronic databases.

Research shows that library use is related to student retention and, ultimately, success. Haddow (2013) compared number of resources borrowed and number of log-ins to authenticated resources between students that remained enrolled in college and students in the subsequent semester and students that later withdrew from college. She found that students who would be retained logged in more to authenticated resources and borrowed more from the library than students who would withdraw. Similarly, Soria et al. (2013) show that using library workstations and logging in to library databases were behaviors consistently and positively related to retention. That academic success is related to library use motivates the present study, as we seek to identify how some actions that university instructors and library staff have taken have influenced students use of library resources and their search process.

Little has been done to date investigated what causes students to decide to use or not use library resources. The purpose of our study is to get a deeper understanding of the undergraduate student information-seeking process from start to finish, and identify factors that influence this behavior. We identify where students report starting their research, what resources they tend to use, attributes they report valuing in their sources, in what physical location they generally conduct their work, and whether they seek help from library staff. We consider a number of explanatory variables that may influence these information-seeking behavior variables, including demographic and academic variables and variables that librarians and instructors control.

Like others, we find that students do value convenience, evidenced from students starting their search process with popular search engines, relying on blogs and websites like Wikipedia for their sources, and reporting a high value on full text availability. Still, we also find that library subscription databases are also popular for beginning the search process and for finding sources. We also find that students do place a high value on sources being peer reviewed, even if it is less values than a source being immediately, electronically available. When we examine variables that influence student behavior, we find evidence that instructors and library staff members can positively influence students' search process.

In the next section we describe students' information-seeking behavior beginning from where the students begin their search process, to what sources the students use and what they value in these sources, so where students actually conduct their work. In section 3, we examine how a set of independent variables influence these information-seeking behavior variables, identifying opportunities for instructors and library staff members to make a difference. Section 4 presents some concluding remarks.

**2 Information Seeking Behavior**

We administered an electronic survey in Fall 2013 to undergraduate students at the University of Wisconsin - La Crosse which measured details about students' information seeking behavior, whether students' curriculum included encouragement or training in using library resources, students' perceived level of success using library resources, information on college major and academic progress, and demographic information. In total, 542 students responded to the survey, but non-responses to some individual questions led to smaller sample sizes in the analysis below.

The information seeking behavior of the students in our sample are similar to those in the studies cited above. A large fraction of students report using popular search engines for finding information for projects involving library research, however the library website and electronic databases are also very popular. Also, while many students report seeking scholarly articles and placing value on the quality of the source, it is also very popular to depend on Wikipedia, blogs and other websites.

Table 1 describes where students begin their search process. It shows the percentage of students that report beginning with popular search engines and websites versus online library search tools such as the library website, library catalog, or electronic database. While a large fraction of students report beginning with Google.com and Wikipedia, almost as many students begin their search process with the library resources.

Table 1: Starting point for information seeking

|  |  |  |
| --- | --- | --- |
| Resource | Frequency | Relative Frequency |
| Library catalog, website, or electronic database | 202 | 42% |
| Google.com | 188 | 39% |
| Google Scholar | 73 | 15% |
| Wikipedia | 6 | 1% |
| Other | 6 | 1% |
| Total Responses | 476 |  |

Using Google or Wikipedia may be an appropriate and comfortable starting point for students while they familiarize themselves with a topic, but we see evidence that many students eventually turn to library electronic databases. Table 2 reports how often students use EBSCO and subject-specific databases when conducting research, whether or not the search began at this point. Students on average report high usage of the EBSCO electronic database in their search process. The interpolated median[[2]](#footnote-3) response for using EBSCO when conducting research was just below “most of the time” and approximately two-thirds of students report using EBSCO “always” or “most of the time.” Subject-specific databases were less frequently used by students, with an interpolated median between “rarely” and “sometimes” with almost half of students reporting use at levels “rarely”, “never”, or “not sure.”

Table 2: Use Frequency for Library Electronic Databases

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute | Never / Not sure (1) | Rarely (2) | Sometimes  (3) | Most of the time (4) | Always  (5) | Interpolated Median | Total Responses |
| EBSCO | 27  5% | 29  6% | 111  23% | 122  46% | 98  20% | 3.84 | 487 |
| Subject-Specific  Databases | 116  24% | 121  25% | 152  31% | 77  16% | 20  4% | 2.53 | 495 |

The search tools students choose should be related to the type of content they seek, so we next explore how much students use scholarly articles, books, articles in the popular press, and possibly less reputable online sources such as Wikipedia and blog posts. Table 3 reports summary statistics on various types of sources, and is ordered by the median response for use frequency. Students report relying on scholarly articles most often; almost two-thirds of the students reported using scholarly articles “often” or “very often.” Still, the next most frequently used source was, “Wikipedia, online blogs, and other websites,” with more than one-third of students reporting relying on such sources “often” or “very often”. This is followed in frequency by books (median response “sometimes”), and the type of source least frequently relied on is articles in popular press (median response “sometimes”).

Table 3: Sources Students Use

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute | Never  (1) | Rarely  (2) | Sometimes  (3) | Often  (4) | Very Often (5) | Interpolated Median | Total Responses |
| Scholarly  Articles | 16  3% | 42  9% | 124  25% | 164  33% | 174  30% | 3.89 | 493 |
| Wikipedia, and similar | 48  10% | 133  27% | 143  29% | 126  25% | 45  9% | 2.96 | 495 |
| Books | 33  7% | 125  25% | 194  39% | 101  20% | 43  9% | 2.96 | 496 |
| Popular Press | 55  11% | 156  32% | 171  35% | 84  17% | 28  6% | 2.71 | 494 |

Students’ decisions for search tools and types of sources they use should depend ultimately on what characteristics of the sources they value. That is, how much do students value peer-review, a source’s reputation, an author’s reputation, or immediate availability of a physical or electronic copy of a source? Table 4 describes how much students report valuing these and other attributes of a source. The table orders the attributes from highest valued to lowest valued by the interpolated median. The responses likely suffer from some response-bias as students on average report valuing very highly almost all of the attributes presented to them in the survey. Still, the order is revealing. Most important to students is whether or not the subject is relevant (as any instructor or librarian would hope, but it is still curious to find as much as 2% of students do place a high value on relevancy). This is followed closely by whether electronic full text is available. Of least concern to students is whether physical copies are available. Taken together, this reveals that students’ preference for a convenient online medium is considered more important than all other considerations except relevancy. Physical availability of resources housed in the library was considered least valuable to students. The next three least important attributes are peer review, author reputation, and source reputation.

Table 4: Attributes for Sources Students Value

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute | Not Important (1) | Somewhat Unimportant (2) | Neutral  (3) | Somewhat Important (4) | Very Important (5) | Interpolated Median | Total |
| Relevant Subject | 1  0% | 0  0% | 9  2% | 84  19% | 342  78% | 4.86 | 436 |
| Full Text Available | 1  0% | 11  3% | 17  4% | 132  30% | 276  63% | 4.71 | 437 |
| Ability to Understand | 2  0% | 6  1% | 16  4% | 173  41% | 224  53% | 4.56 | 421 |
| Recent Publication | 4  1% | 18  4% | 19  5% | 201  49% | 166  41% | 4.31 | 408 |
| Peer Reviewed | 6  2% | 41  11% | 62  16% | 131  35% | 138  37% | 4.11 | 378 |
| Author Reputation | 5  1% | 32  9% | 56  15% | 163  43% | 120  32% | 4.08 | 376 |
| Source Reputation | 4  1% | 39  11% | 76  21% | 181  49% | 70  19% | 3.86 | 370 |
| Physical Availability | 52  14% | 96  26% | 71  19% | 96  26% | 57  15% | 3.04 | 372 |

Since students have a high preference for electronically available full text and place little value on physical availability, it may be that students have a need or preference to conduct library research outside of the physical library. Both popular search engines and the library electronic databases are available online on and off campus. Still, there is a benefit to using the physical library: library staff members are on hand to help students navigate electronic databases, understand their sources, and even help find information on a particular topic. To determine if students are missing out on this opportunity, we investigate where students conduct their research, how often they visit the library facility for research or other purposes, and whether they take advantage of the expertise of the library staff.

Table 5 describes where students report conducting most of their work involving library research. More than half of students report using the library most often, but this is followed by more than one-third of students working primarily in their residence, and a small fraction do their work in other locations. We also asked students how frequently they visit the library in person for any reason. Table 6 shows these responses, revealing that more than half of the students visit the library at least once per week.

Table 5: Where Students Conduct Most of Their Library Research

|  |  |  |
| --- | --- | --- |
| Location | Frequency | Relative Frequency |
| On-campus Library | 316 | 58% |
| Residence | 201 | 37% |
| Other off-campus building | 14 | 3% |
| Other on-campus building | 11 | 2% |
| Total responses | 542 |  |

Table 6: How Often do Students Visit the Library in a Typical Week

|  |  |  |
| --- | --- | --- |
| Response | Frequency | Relative Frequency |
| More than 4 times per week (5) | 84 | 16% |
| 2-3 times per week (4) | 134 | 25% |
| Once per week (3) | 83 | 15% |
| 2-3 times per month (2) | 135 | 25% |
| Once per month or less (1) | 106 | 20% |
| Interpolated Median | 2.86 |  |
| Total Responses | 542 |  |

A majority of students in our sample do use the library facility regularly and when working on projects involving library research. Table 7 reveals how often students seek assistance from reference desk librarians or library staff. We found that students generally do not seek help from library staff. More than three-quarters of students report never or rarely ever ask for assistance; the interpolated median is just below the response “rarely.”

Table 7: How Often Students Seek Assistance from Library Staff

|  |  |  |
| --- | --- | --- |
| Response | Frequency | Relative Frequency |
| Very Often (5) | 6 | 1% |
| Often (4) | 21 | 4% |
| Sometimes (3) | 98 | 19% |
| Rarely (2) | 244 | 47% |
| Never (1) | 149 | 29% |
| Interpolated Median | 1.95 |  |
| Total Responses | 518 |  |

These results suggest an opportunity for library staff and instructors to help students. Students reveal valuing a convenient electronic medium for information very highly while still regularly visiting the physical library where expertise assistance and physical resources are nearby and under utilized. Most students in our sample visit the library frequently but leave the library staff alone, focusing instead on the electronic resources that are available from any computer with an internet connection. There is an opportunity to encourage students to reach out to library staff to learn more about understanding what is peer review, how to identify source credibility and reputation, and how to use search tools effectively to find valuable sources.

We next turn to understanding factors that explain the information-seeking variables that we describe in this section.

**3 Influences on Information Seeking Behavior**

Libraries use a lot of resources subscribing to and maintaining peer reviewed journals and electronic databases and many instructors prefer their students use these types of sources and understand how to navigate through scholarly literature. Given that students commonly use both scholarly literature and less academic sources such as Wikipedia and that students commonly use both library electronic databases and popular web search engines, what influences information seeking behavior? We explore demographic and academic variables, and variables within instructors’ and librarians’ control. The latter can help inform instructors’ and library staff policies and teaching strategies, and the former can identify sub-populations where library staff and instructors can place more focus. In this section we will determine how these explanatory variables influence the variables in the previous section that describe student information seeking behavior.

**3.1 Explanatory Variables**

We consider the explanatory variables in Table 8. Three of these are decision variables, variables are related to decisions within instructors’ and / or librarians’ control. The first such variable, *Encourage*, is a binary variable that derives from a survey question that asked students how often their instructors encouraged them to use the library's electronic databases when assigning projects involving library research. Students could respond on a four-point scale ranging from ‘Never’ to ‘Frequently.’ Responses of ‘Frequently’ were given a score equal to 1.0 and all others equal to 0.0. More than two-thirds of students reported instructors frequently encouraged them to use this resource.

The variable *List* is also a measure of instructors’ practices. This is a binary variable deriving from a survey question asking students how often instructors give them a reference list of articles and/or books that they can use as a starting point for projects or assignments involving library research. Again students could respond on a four-point scale ranging from ‘Never’ to ‘Frequently.’ Responses of ‘Frequently’ or ‘Occasionally’ were given a score equal to 1.0 and all others equal to 0.0. More than one-half of students reported that their instructors at least occasionally gave them reference lists for their assignments.

The last decision variable includes a common collaboration between library staff and instructors at UW-L where a library staff member gives a presentation to a class, during the regular class period, that is customized for the course or even for a particular assignment or project. One such collaboration exists in all sections of a freshman-level oral communications class that is required of all students. Early in every UW-L student’s college career, he or she should have been exposed to at least one such presentation. Still, at the point in time when we conducted the survey, not all students had completed this class yet, and it’s likely some students were missing from class on this day. The binary variable *ClassVisit* is equal to 1.0 if the student reported having attended a class with such a presentation and 0.0 otherwise. The survey reveals that 78% of students in our sample reported having attended such a presentation in at least one of their class.

Table 8: Explanatory Variables for Information Seeking Behavior

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Scale | Description | Descriptive Statistic |
| *Encourage* | Binary | Equal to 1 if instructors frequently encourage students to use library electronic databases | Proportion = 68% |
| *List* | Binary | Equal to 1 if instructors frequently or occasionally give reading lists to students | Proportion = 51% |
| *ClassVisit* | Binary | Equal to 1 if a library staff member ever gave a presentation in any of a student’s classes | Proportion = 78% |
| *ColBus* | Binary | Equal to 1 if a student’s major is in the College of Business Administration | Proportion = 25% |
| *ColSci* | Binary | Equal to 1 if a student’s major is the the College of Science and Health | Proportion = 39% |
| *ACT* | Interval | A student’s score on the ACT college readiness exam. | Mean = 25.4 |
| *Age* | Ratio | Student’s age | Mean = 21.3 |
| *ParentEdu* | Binary | Equal to 1 if the highest level of education by either student’s parents includes at least a four year college degree | Proportion = 57% |
| *Female* | Binary | Equal to 1 if students indicated sex as female | Proportion = 70% |
| *Nonwhite* | Binary | Equal to 1 if student indicated any race besides White / Caucasian | Proportion = 5.7% |

The next three explanatory variables in Table 8 capture academic information that may influence information seeking behavior. The binary variables *ColBus* and *ColSci* indicate whether a student’s major or intended major is in the College of Business or the College of Science and Health. There is one other college at UW-L, which serves at the excluded category in the analysis below, the College of Liberal Studies. Coefficients on *ColBus* and *ColSci* indicate the relative difference in information seeking behavior of the students with majors in these colleges relative to students with a major in the College of Liberal Studies. The estimated impact these variables have on information seeking behavior are especially useful to instructors and library staff as they help identify subsets of the student population that may be in most need of intervention.

We account for students' previous academic ability with their score on the ACT college readiness exam which is taken prior to being admitted to UW-L. The variable *ACT* is equal to the score students reported on the exam, and is given as an integer from 1-36, with higher scores indicating better test performance.

The remaining explanatory variables capture students' demographic information. The variable *Age* is the age of the student. It is not surprisingly highly correlated with year in school, and too much so for both variables to be included in the analysis below without multicolinearity problems. Including either variable on its own captures the combined effect that maturity and additional schooling has on information seeking behavior.

The effect that parents' level of education has on students' information seeking behavior is captured by *ParentEdu,* a binary variable equal to 1.0 if the highest level of education achieved by either parent or guardian is at least a four-year college degree. Just over half of the students in our sample report having at least one parent or guardian with a four-year college degree.

The final two variables are binary variables for sex (70% of respondents were female which is slightly larger than the student population) and race which is measured by an indicator that a student identifying most with a race other than White / Caucasian (approximately 6% of students selected another race, which is consistent with the student population).

**3.2 Regression Analysis**

We now turn to measuring the influence that these explanatory variables have on student information seeking behavior. We begin with where students begin their research process. We estimate a logistic regression with a binary dependent variable equal to 1.0 when students began their research process from a library or scholarly source including the university library website, one of the library electronic databases, or Google Scholar. The dependent variable is equal to 0.0 for other arguably less scholarly starting points such as Wikipedia or Google.com. Table 9 reports the results.

There are four significant explanatory variables explaining where students begin their research process: *List, ColBus, Female,* and *Nonwhite*. When instructors give students reference lists to help them begin their research process, students were less likely to start with the library website or electronic databases. Students with college of business majors were less likely that students with majors in the college of liberal studies to start with a scholarly search tool. Women were more likely than men to start with these academic search tools, as are non-white student (significant at the 10% level). The pseudo R-squared[[3]](#footnote-4) value equal to approximately 4% indicates most of differences between students in their starting points are not explained by outside the independent variables in the model, but the highly significant likelihood ratio test indicates the variables are relevant in explaining the outcome variable.

Table 9: Logistic Regression Results

Dependent Variable: Scholarly Starting Point for Research Process

|  |  |  |
| --- | --- | --- |
| Variable | Coefficient | P-value |
| *Constant* | -0.69 | 0.626 |
| *Encourage* | 0.11 | 0.802 |
| *List* | -0.43 | 0.038\*\* |
| *ClassVisit* | 0.03 | 0.902 |
| *ColBus* | -0.47 | 0.078\* |
| *ColSci* | -0.24 | 0.317 |
| *ACT* | -0.02 | 0.681 |
| *Age* | 0.05 | 0.147 |
| *ParentEdu* | -0.08 | 0.700 |
| *Female* | 0.67 | 0.004\*\*\* |
| *Nonwhite* | 1.04 | 0.073\* |
| *Likelihood Ratio Test* | 23.37 | 0.009\*\*\* |
| *Log Likelihood* | -275.86 | |
| *Pseudo R-squared* | 0.041 | |
| *Sample size* | 423 | |

Notes: Dependent variable is equal to 1.0 if students started search process with a search tool that is

academic in nature including the library’s electronic databases, the library website, and Google Scholar.

\*\*\* Significant at 1% level, \*\* Significant at 5% level, \* Significant at 1% level

We next explore what affects how often students use EBSCO and subject-specific databases for their research on a five point ordinal scale that ranged from ‘never’ to ‘always’. We combine these two variables for into a single variable for electronic database use by taking the maximum of each student’s response for EBSCO versus subject-specific databases. Because the dependent variable is measured on an ordinal scale, we estimate an ordered logit regression. The results are given in Table 10.

Table 10: Ordered Logit Regression - Frequency Using Library Electronic Databases

|  |  |  |
| --- | --- | --- |
| Variable | Coefficient | P-value |
| *Encourage* | 1.65 | 0.000\*\*\* |
| *List* | 0.25 | 0.185 |
| *ClassVisit* | 0.72 | 0.001\*\*\* |
| *ColBus* | -0.71 | 0.004\*\*\* |
| *ColSci* | -0.55 | 0.011\*\*\* |
| *ACT* | 0.04 | 0.239 |
| *Age* | 0.01 | 0.790 |
| *ParentEdu* | 0.29 | 0.138 |
| *Female* | 0.45 | 0.034\*\* |
| *Nonwhite* | 0.3 | 0.540 |
| *Likelihood Ratio Test* | 56.32 | 0.000\*\*\* |
| *Log Likelihood* | -515.70 | |
| *Pseudo R-squared* | 0.052 | |
| *Sample size* | 410 | |

Notes: Dependent variable is the frequency using EBSCO or subject specific databases

(maximum of the two) for assignments involving library research on the five point scale:

never, rarely, sometimes, most of the time, always.

\*\*\* Significant at 1% level, \*\* Significant at 5% level, \* Significant at 1% level

Here we find significant statistical evidence that when instructors encourage students to use electronic databases, they use these more frequently. Interestingly, we fail to find significant statistical evidence that instructors giving students reference lists leads to any change in how frequently students use electronic databases, and in fact the coefficient is positive. This is in contrast to the finding above that giving students reference lists led to a decrease in use of scholarly search engines as students’ as a starting point for their search process. The final variable within librarians’ and instructors’ control is also statistically significant and positive. When students were exposed to a presentation by a library staff member in their classes, they more frequently used the library electronic databases.

The coefficients on *ColBus and ColSci* are both statistically significant and negative which indicates students with liberal studies majors or intended majors more frequently use electronic databases than do students with business or science majors.

The likelihood ratio test and pseudo R-squared values are similar to the previous regression. The group of independent variables as a whole is relevant in explaining the dependent variable, with approximately 5% of the variability in students use of electronic databases explained by the independent variables.

Table 11 reports ordered logistic regression results for the four dependent variables measuring how often students use various types of sources. The columns are ordered in the same manner as the rows in Table 3; columns are sorted left to right by median frequency students report using each sources, with more frequently used sources listed first.

Table 11: Ordered Logit Regressions - Sources Student Use

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Scholarly Articles | | Wikipedia and Similar | | Books | | Popular Press | |
| Variable | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value |
| *Encourage* | 1.192 | 0.002\*\*\* | 0.016 | 0.967 | 0.709 | 0.075\* | 0.132 | 0.728 |
| *List* | -0.151 | 0.407 | 0.075 | 0.679 | 0.364 | 0.045\*\* | 0.142 | 0.439 |
| *ClassVisit* | 0.248 | 0.268 | 0.139 | 0.523 | -0.278 | 0.206 | -0.060 | 0.785 |
| *ColBus* | -0.472 | 0.047\*\* | 0.850 | 0.000\*\*\* | -0.675 | 0.005\*\*\* | 0.534 | 0.025\*\*\* |
| *ColSci* | -0.475 | 0.025\*\* | 0.346 | 0.096\* | -0.196 | 0.347 | -0.340 | 0.103 |
| *ACT* | 0.148 | 0.005\*\*\* | 0.080 | 0.045\*\* | 0.055 | 0.149 | 0.089 | 0.018\*\*\* |
| *Age* | 0.008 | 0.774 | -0.041 | 0.162 | -0.009 | 0.765 | -0.044 | 0.123 |
| *ParentEdu* | -0.020 | 0.916 | 0.146 | 0.438 | -0.069 | 0.719 | -0.001 | 0.995 |
| *Female* | 0.308 | 0.150 | 0.021 | 0.920 | 0.055 | 0.792 | 0.399 | 0.055\* |
| *Nonwhite* | -0.011 | 0.982 | 0.358 | 0.412 | -0.081 | 0.864 | -0.192 | 0.689 |
| *Likelihood Ratio Test* | 32.3 | 0.000\*\*\* | 22.2 | 0.014\*\* | 21.48 | 0.018\*\* | 27.61 | 0.002\*\*\* |
| *Log Likelihood* | -565.71 | | -615.13 | | -590.59 | | -594.62 | |
| *Pseudo*  *R-squared* | 0.027 | | 0.018 | | 0.018 | | 0.023 | |
| *Sample size* | 406 | | 404 | | 408 | | 407 | |

Notes: Dependent variable is the frequency using each type of source described in the column headings on the five point scale: never, rarely, sometimes, most of the time, always.

\*\*\* Significant at 1% level, \*\* Significant at 5% level, \* Significant at 1% level

Of particular interest is whether the variables within instructors’ and librarians’ control is a significant predictor for how often students use each resource. The coefficient on the variable *Encourage* is statistically significantly and positive for two the dependent variables, S*cholarly articles* and B*ooks*. This indicates that instructors’ encouragement to use library electronic resources is positively associated with students using scholarly articles and books more frequently in their research. The coefficient on *List* is statistically significant only for the dependent variable *Books.* If instructors want to particularly influence students to use the library’s books in circulation, the positive coefficient on *List* identifies another effective nudge instructors can give to students, to provide a list of useful references to the students, presumably one that includes books in the library’s circulation.

The ordinal logit results concerning the lesser academic types of sources including popular press articles and Wikipedia, blogs, and similar websites reveal that business students are more likely to use such sources than students in the other colleges. Also ACT is statistically significant and positive. Perhaps surprisingly, students that performed better on their college entrance exam were more likely to use these types of sources.

In all ordered logit regressions, the likelihood ratio tests indicated the independent variables do help explain the outcome variables, but the pseudo R-squared values reveal that much of the variability in the frequency using each type of resource is explained by other variables not be included in the model.

Table 12 explores how the explanatory variables may influence what attributes in a source students value. The dependent variables are the eight attributes or qualities of sources that students may value, as listed in the Table 4. The columns are ordered in the same manner as Table 4. From left to right, the columns are ordered by the median response to how highly students value each attribute, with more highly valued attributes appearing first. With one notable exception, the coefficients on the variables within instructors' and library staff members control are rarely statistically significant. For most of the dependent variables, we fail to find evidence that the actions we measured currently taken by faculty members influence how much students value each attribute. The notable exception is peer-reviewed attribute. When instructors provided a reference list to students, on average students reported a higher median value placed on peer review. Also, when library staff members visited students class, students on average valued peer review more highly. Also from regression, we see that *ColBus* is statistically significant and negative, revealing the business students place less value on peer-review than students with majors in liberal studies.

**4. Conclusion**

Informed from a survey we administered to undergraduate students, we describe students' information seeking behavior beginning where the students begin their search process, to the types of databases or search engines they use, to the types of sources they gather, to what qualities students value in the sources they choose, and finally where they physically conduct their research. Like much of the literature on the subject, we find that students put a high value on electronic convenience. This is evidenced from nearly 40% of students starting their search process with Google.com; frequent use of Wikipedia, second to scholarly articles, but ahead of popular press articles and books; and reporting a very high value on full text availability, on average, higher in importance than an article being recent, peer reviewed, or come from a reputable source or author. Students reported full text availability as even higher in importance than the student being able to understand the source.

Still, we also see high usage of the library subscription databases. Almost half of students report beginning their search process at the library catalog, library website, or a subscription database, and students reported frequently using the EBSCO database. Despite the popularity of Wikipedia and blogs, students did report using scholarly articles more often than these other types sources, and students on average rated peer-review as a “somewhat important” quality. We also find that students do visit the physical library frequently, to conduct their work involving library research, and frequently during the week for any reason.

The regression analysis identifies avenues for the opportunity to positively influence students search process. We find several variables significantly explain students' information seeking behavior, including variables that instructors and library staff members can control. For example, we find that students' use of the library electronic databases is positively influenced by instructors' encouragement and classroom visits by library staff members. We also find that instructors encouragement leads to more use of scholarly articles and books in books. Library staff members also positively affect the value students place on sources being peer reviewed. While there is still much that can be done to guide students' information-seeking process, it is encouraging to find that students do use library subscription search tools and sources and that students' information-seeking behavior can be positively influenced by instructors and library staff members.

Table 12: Ordered Logit Regressions - Attributes Student Value

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Relevant | | Full Text Available | | Ability to Understand | | Recent | |
| Variable | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value |
| *Encourage* | 0.407 | 0.407 | -0.478 | 0.349 | 0.150 | 0.733 | -0.110 | 0.809 |
| *List* | -0.167 | 0.511 | -0.285 | 0.181 | 0.116 | 0.577 | 0.290 | 0.157 |
| *ClassVisit* | -0.052 | 0.864 | 0.201 | 0.436 | 0.208 | 0.397 | 0.437 | 0.083\* |
| *ColBus* | -0.321 | 0.330 | -0.523 | 0.053\* | -0.175 | 0.514 | 0.425 | 0.116 |
| *ColSci* | -0.360 | 0.234 | 0.034 | 0.894 | 0.090 | 0.708 | 0.055 | 0.816 |
| *ACT* | -0.034 | 0.432 | 0.282 | 0.000\*\*\* | -0.006 | 0.887 | -0.028 | 0.479 |
| *Age* | 0.078 | 0.061\* | 0.021 | 0.533 | -0.043 | 0.197 | -0.077 | 0.020\*\* |
| *ParentEdu* | 0.139 | 0.598 | 0.137 | 0.539 | -0.065 | 0.766 | 0.111 | 0.608 |
| *Female* | 0.744 | 0.006\*\*\* | 0.729 | 0.003\*\*\* | 0.742 | 0.002\*\*\* | 0.467 | 0.051\* |
| *Nonwhite* | 0.936 | 0.248 | 0.453 | 0.483 | 0.392 | 0.506 | -0.014 | 0.980 |
| *Likelihood Ratio Test* | 18.29 | 0.050\*\* | 31.24 | 0.001\*\*\* | 17.63 | 0.062\* | 18.99 | 0.040\*\* |
| *Log Likelihood* | -231.89 | | -342.10 | | -343.90 | | -377.04 | |
| *Pseudo*  *R-squared2* | 0.038 | | 0.044 | | 0.025 | | 0.025 | |
| *Sample size* | 391 | | 391 | | 375 | | 365 | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Author Reputation | | Peer Reviewed | | Source Reputation | | Physical Availability | |
| Variable | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value | Coefficient | P-value |
| *Encourage* | 0.184 | 0.695 | 0.631 | 0.170 | -0.081 | 0.870 | 0.062 | 0.890 |
| *List* | 0.077 | 0.704 | 0.552 | 0.006\*\*\* | 0.189 | 0.360 | -0.044 | 0.825 |
| *ClassVisit* | 0.131 | 0.590 | 0.472 | 0.058\* | -0.396 | 0.117 | -0.485 | 0.044\*\* |
| *ColBus* | 0.281 | 0.296 | -0.698 | 0.009\*\*\* | 0.669 | 0.016\*\* | -0.360 | 0.158 |
| *ColSci* | 0.221 | 0.344 | 0.161 | 0.500 | 0.240 | 0.308 | 0.096 | 0.678 |
| *ACT* | -0.097 | 0.105 | 0.087 | 0.114 | 0.017 | 0.679 | 0.035 | 0.375 |
| *Age* | -0.022 | 0.503 | -0.022 | 0.513 | -0.070 | 0.037\*\* | -0.128 | 0.000\*\*\* |
| *ParentEdu* | -0.331 | 0.124 | -0.309 | 0.146 | -0.294 | 0.181 | -0.302 | 0.152 |
| *Female* | 0.136 | 0.573 | -0.297 | 0.205 | 0.962 | 0.000\*\*\* | 0.961 | 0.000\*\*\* |
| *Nonwhite* | 0.182 | 0.744 | 0.183 | 0.741 | 0.843 | 0.133 | 0.059 | 0.914 |
| *Likelihood Ratio Test* | 7.55 | 0.673 | 32.55 | 0.000\*\*\* | 35.28 | 0.000\*\*\* | 49.71 | 0.000\*\*\* |
| *Log Likelihood* | -442.23 | | -454.58 | | -419.93 | | -515.60 | |
| *Pseudo*  *R-squared2* | 0.008 | | 0.035 | | 0.041 | | 0.046 | |
| *Sample size* | 335 | | 336 | | 330 | | 331 | |

Notes: Dependent variable is the level of importance students report for sources' attributes that are described in the column headings on the five point scale: not at all important, somewhat important, neutral, somewhat important, and very important. \*\*\* Significant at 1% level, \*\* Significant at 5% level, \* Significant at 1% level

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2. The interpolated median is a measure of measure of center appropriate for ordinal variables that is related to the median but offers more precision for ordinal variables with a small number of possible outcomes where many observations are exactly equal to the mean. It informs whether the distribution is more heavily weighted *strictly* *above* or *strictly* *below* the median value. Let M denote the standard median, nL denote the number of observations strictly below the median, nG denote the number of observations strictly below the median, and nE denote the number of observations exactly equal to the median. The interpolated median is given by IM = M + (nL + nG) / (2 nE). [↑](#footnote-ref-3)
3. McFadden's (1974) Pseudo R-squared = 1 – LogLik / NullLogLik, where *LogLik* is the log likelihood of the estimated regression equation and *NullLogLik* is the value of the log likelihood where the dependent variable is regressed only against an intercept. [↑](#footnote-ref-4)