



Usage of E-resources: Virtual Value of Demographics

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ABSTRACT

The focus of this study was to identify: 1) usage of library e-resources by faculty and staff affiliation and status to identify research and teaching needs; 2) usage of library e-resources by student major, status, gender, registered disability and registered veteran to establish best outreach practices and areas that need service improvement and collection development in support of student learning; and 3) the correlation between use of library e-resources and student attainment as defined by grade point average (GPA). Demographic data was collected for these users based on their university NetID logins. The findings in this study conclusively document that students and faculty use library e-resources to a statistically significant extent and that a statistical relationship exists between student GPA and their use of e-resources. This information confirms the value of library resources to institutional teaching and research needs and can be used to document library value to the institutional mission.

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INTRODUCTION

During recent decades, academic libraries have responded to the transformation of information resources from primarily that of hard copy to a dynamic interface of access to electronic resources (e-resources). As a result, services and collections have evolved to meet the needs of virtual users, and collection budgets further reflect this evolution. ARL statistics document that e-resources accounted for 13% of total expenditures in ARL member libraries in 2000 and had increased to 51% by 2008. Similarly, in 2013 at the University of Montana Mansfield Library, e-resources represent 69.1% of the collection budget.

Academic libraries also grapple with efforts to collect and analyze usage data of e-resources in order to refine their collection policies and to share this information with their institutions. More importantly, libraries want and need assessment information that documents the library's contribution to its institutional outcomes. The focus of this study was to identify: 1) usage of library e-resources by faculty and staff affiliation and status to identify research and teaching needs; 2) usage of library e-resources by student major, status, gender, registered disability and registered veteran to establish best outreach practices and areas that need service improvement and collection development in support of student learning; and 3) the correlation between use of library e-resources and student attainment as defined by grade point average (GPA). In combination with circulation statistics, data analysis of library users who access these resources can assist library liaisons in their practices of outreach and collection development in direct relation to faculty, staff, and student usage patterns.

LITERATURE REVIEW

While data regarding use of library e-resources proliferates, analysis of this use and its relationship to library users is complex. Most assessment of electronic resource usage is still based on the input–output model but continues to adopt standards and tools that consistently measure e-resource use along with established intercept survey methodologies (ARL, 2013; Grogg & Fleming-May, 2010).

Most relevant to this study are those analyses that seek to link library usage, specifically e-resource usage, to academic outcomes. Matthews (2012) suggests that library usage data should be part of a coordinated program of data analysis that is combined with both indirect measures of learning (student persistence, graduate rates) and direct measures of student learning that are part of national standardized test results. Some excellent examples of this approach are currently underway. The Library Impact Data Project (Stone & Ramsden, 2013) successfully demonstrated a statistically significant relationship between library resource use and level of degree result. There was a 6-month project that measured e-resource usage, library borrowing, and library gate entries against final degree awarded for 33,074 undergraduate students across eight U.K. universities. They caution that their results do not establish a causal relationship between library usage and student attainment.

Another innovative approach is the “Library Cube,” the result of collaboration among the library, university administration, Performance Indicator Project Team, and information technology services (Cox & Jantti, 2012). The Library Cube consists of a multidimensional data warehouse that links student borrowing and use of e-resources to student grades and a system that allows users to create cross tabulated data views. Among other findings, they found a very strong nonlinear correlation between average usage of library resources and average

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student grades. These authors report that this is now an integral part of their university's performance reporting structure and have identified potential target audiences for library engagement strategies.

Two recent studies document correlations between library usage and student success. *Soria, Fransen, and Nackerud (2014)* focused on first-year undergraduates and identified four library use areas that were consistently and positively associated with student GPA. These use areas included database logins, book loans, electronic journal logins, and library workstation logins. *Davidson, Rollins, and Cherry (2013)* used authentication login data combined with associated demographics to analyze student users. Data shows a correlation between people who have higher GPAs and those who use library databases. Grouping the students by department allows for a focused outreach to those departments who are using the library at lower rates.

Little information has been reported about linking library e-resource usage to the demographics of unique subsets of library users; e.g., gender, students with disabilities or student veterans. While *Price and Fleming-May (2011)* stress the need for libraries to demonstrate, quantitatively and qualitatively, the value of library resources and services and their return on investment in an academic environment, this is a complex narrative.

METHODOLOGY

The University of Montana is a graduate level research university. At the time of this study during fall semester 2012, 12,656 undergraduate and 2290 graduate students were enrolled and 840 faculty and 1560 staff served the campus. This population includes students registered with a disability as the largest minority and student veterans whose numbers place Montana second in the nation with number of veterans per capita. All library users who connect to the Library's e-resources from off-campus are required to authenticate as faculty, staff, or students of the University of Montana. This authentication data was collected between July 1 and December 31, 2012. To compare off-campus users with on-campus users who are not required to authenticate, 5 random days during each of the six months were set up to require on-campus authentication. Thus, 4 data sets were collected:

- all off-campus users of e-resources during the entire time period;
- on-campus users of e-resources for 30 random days;
- off-campus users of e-resources for 30 random days; and
- all random day users.

Demographic data was then collected for these users based on their university NetID. Authentication data was collected from the standard logs created by our proxy server, EzProxy. EzProxy logs the starting point uniform resource locator (url) access for each resource when a user clicks on a link from the library. Local users are logged without a username, just "local," along with the url to the resource they are accessing. When an off-campus user accesses a resource, their username is captured in the log as well. During our randomly selected days, we treated all users as remote, thus enforcing a log on and capturing a username for every resource accessed. The anonymized demographic data includes status of each user, department affiliation of faculty and staff, major area of study of students, gender, degree type, grade point average, ethnicity, disability, and veteran status.

All analyses were conducted using IBM SPSS Statistics 21 (*Hines, 2013*). Tested for normality using the Kolmogorov–Smirnov test in the four dependent variables based on frequency, the data was not normally distributed. The main dependent variable was determined to be the combined count of on-campus and off-campus access for users on randomly selected days. Thus, nonparametric statistical models that do not assume normality were used for analysis, and results presented are those of the all random day user group variable.

Two population tests, the binomial test and the chi-square goodness of fit test, were used to determine if the random data sample was

consistent with the sampled population and to test hypotheses about the population. The binomial test is a test of statistical significance of deviations from an expected distribution of observations when there are only two outcomes or categories. The chi-square goodness of fit tests whether the observed proportions for a categorical variable with more than two categories differ from expected proportions. For each test, a statistically significant result indicates that the null hypothesis, that observations in the sample are equal to the proportion in the population, is rejected. Outliers were identified as individuals who accessed more than 500 library resources—9 individuals across all four variables—and were excluded from the detailed analysis.

Statistical tests used in evaluations included nonparametric tests of the means and distributions of the samples based on different categories and a generalized linear model designed to predict the relative importance of different variables on the frequency of use. The Wilcoxon signed rank sum test is the nonparametric version of a paired samples t-test used to determine if the medians on two related observations differ from one another. The Friedman test is used to determine the distribution of observations in related samples. The Kruskal–Wallis test is the nonparametric version of ANOVA and is used when you have one independent variable with two or more levels and an ordinal dependent variable. The Wilcoxon–Mann–Whitney test or independent sample median test is used to determine if the median variables differ from one another among independent observations.

In all cases, evaluation tests were based on the data set of users in the all random selected variables since this data is a true sample of the population of users during the Fall 2012 semester. The dependent variable in all of these evaluations is the count or frequency at which a user accessed library e-resources. The Institutional Review Board exempted this project due to the anonymization of the data and its focus on improved library services and library collections.

ANALYSIS

To provide context, a total of 8105 unique NetID logins were documented during the data collection (*Table 1*). Authenticated usage by status of users identifies that the greatest use is by undergraduate students (71.1%), then graduate students (20.3%), faculty (06.3%), and staff (00.1%). The more interesting interpretation of this data, however, shows that 71.7% of all graduate students, 61.2% of all faculty, 45.5% of all undergraduate students, and 12.0% of all staff used e-resources during the timeframe of the study. Total electronic usage during the study represented 46.7% of all potential users.

FACULTY USERS

Using the hypothesis that faculty rank affects library use of e-resources, the chi-square test examined whether the observed population of tenure-track faculty matched the reported number of faculty in each rank during the fall semester of 2012. The results are statistically significant (*Table 2*) and do show that full, associate and assistant professors used electronic library resources at numbers higher than expected. Substantively, however, the test can only be interpreted to suggest that faculty with the rank of instructor are underutilizing the library given their numbers on campus.

Table 1

Total usage of e-resources by status for control group and total population where N = sample size; % = % of sample; Total N = total user group; and Total % = % of total user group.

Status	N	%	Total N	Total %
Faculty	514	06.3	840	61.2
Staff	187	00.1	1560	12.0
Undergraduate students	5761	71.1	12,656	45.5
Graduate students	1643	20.3	2290	71.7
Total	8105	100.0	17,347	46.7

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