Return on Investment: Libraries and Student Retention

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Using data on libraries collected by the Association of Research Libraries (ARL) and the Association of College and Research Libraries (ACRL), as well as fall-to-fall retention rates obtained from the Integrated Postsecondary Education Data System (IPEDS) of the National Center for Education Statistics (NCES), this study employs statistical measures of association to analyze the relationship of both library expenditures and number of professional library staff to student persistence. The strongest relationships found were those between student retention and total library expenditures, total library materials costs, and serial costs for institutions categorized as baccalaureate colleges within the Carnegie Classification System. The most significant relationship between persistence and number of library professional staff was discovered to occur at doctoral-granting institutions.

INTRODUCTION

Libraries, by function, are an integral part of the college experience. They are a place where necessary resources are provided and research assistance can be obtained. It is generally acknowledged that the academic library and academic librarians play a fundamental role in the education of students. Today, academic libraries can no longer be complacent about their “good” status. There is growing pressure on all academic library managers to be more accountable for how they use limited resources and to achieve institutional outcomes perceived as important by college and university stakeholders. Such stakeholders include students, faculty, and academic staff and administrators; as well as accreditation agencies.

One such outcome is student persistence. Retaining a student is fundamental to the ability of an academic institution to carry out its mission. A high rate of attrition is indicative of a failure on the part of an institution to achieve its purpose. For institutions that rely heavily on tuition and fees to support academic programs and services, including the library, student retention is critical.

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How can the impact of academic libraries on campus-wide educational outcomes, such as student persistence, be assessed? Rarely does empirical research connecting student outcomes with campus services and resources mention libraries. Performance indicators are needed that demonstrate the academic library’s impact on desired educational outcomes, as well as methods to measure them. Libraries need to be able to demonstrate how expenditures for resources and services result in significant contributions to academic and social environments that positively impact institutional outcomes such as student persistence.

Is there a direct connection between campus-wide retention and the academic library? Using library expenditures and
number of professional library staff as indicators of the resources essential to providing library services, an analysis was undertaken to establish the impact of these inputs on student persistence.

**Literature Review**

Many traditional models that seek to explain the student persistence/withdrawal process can be applied to libraries, although they leave specific questions concerning the impact of libraries on student retention unanswered. Surveying the literature on the role of libraries in student persistence reveals that too little research has been carried out on this subject.

One of the earliest discussions of the library’s role in student persistence is found in Kramer and Kramer’s 1968 study that showed a statistically significant correlation between library use, as evidenced by library book borrowing, and persistence among college freshmen at California State Polytechnic College, Pomona. Of the students that used the library, 73.7 percent returned the following Fall, while only 57 percent of the freshmen who never used the library persisted.

In a controlled experiment at Brooklyn College in 1972, Breivik confirmed the retention potential of library-based instruction by determining the percentage of students from three experimental groups that completed course work with credit during the subsequent semester. Seventy-seven percent of students that received weekly library instruction, as well as 71 percent of students that were given only a library tour with catalog and periodical index lectures, went on to complete course work the following semester. Only 68.75 percent of control students who had received no library instruction did so.

While student attrition occurs for a variety of reasons, Beal and Noel (1980), Tinto (1996), and Braunstein, McGrath, and Pescatrice (2000–2001) all identify academic performance as a major, if not the most significant, cause of student withdrawal. Attainment of information competency and related skills, such as the ability to research effectively using print, online, and electronic retrieval systems, is essential to the learning process. The Monteith Library Project (Knapp, 1966) found that students exposed to a library skills program showed lower attrition, higher grades, and higher Graduate Record Examination (GRE) scores than class mates. In a study designed to test the hypothesis that there is a positive correlation between academic performance and the usage of library research tools, Hiscock (1986) reported that students “who used the library catalogue more frequently performed better academically than those who did not.”

A major theoretical advance in attrition research was Tinto’s (1975) model of the student persistence/withdrawal process. The model assumes persistence/withdrawal is largely determined by student integration into the social and academic systems of an institution. The greater a student’s level of integration into these systems, the greater the commitment to the college and to the goal of graduation. These commitments have a direct, positive influence on persistence. In subsequent studies on student integration into academic and social systems by Munro (1981), as well as by Terenzini and Pascarella (1978), integration of students into an institution’s academic setting was found to have the more significant effect on student persistence.

Tinto’s model maintains the importance of libraries in encouraging retention. A study to discover the relationship of student usage of campus facilities to retention (Mallinckrodt and Seldacek, 1987) found that four of six significant predictors of student retention involved use of the library, while Lara (1981) determined that students who persisted engaged in library related academic activities, such as using journal indexes, more frequently. Bean (2003) refers to specific campus resources, such as the library, as academic factors affecting student retention decisions. He also identifies physical places for socializing, including library study areas, as being an element common to programs designed to encourage student persistence.

In their 1986 study, Pascarella, Smart, and Ethington found that “the personal relationships that students develop with faculty and staff are a potentially significant factor in their persistence/withdrawal behavior.” Johnson (1997), in a study of student persistence factors, supported this finding by concluding that faculty-student and staff-student interactions are of the highest importance.

Pascarella and Terenzini (1991) propose that increased interactions between faculty and students strengthen personal bonds between the student and the institution, thus increasing social integration and persistence. They found that freshman-to-sophomore persistence was positively and significantly related to the amount of student-faculty non-classroom contact and suggested that non-classroom interactions with faculty that integrate student classroom and non-classroom experiences are most important to persistence.

Kelly (1995) argues that libraries are “an integral part of the college experience” and identifies academic libraries and librarians as playing a “pivotal role in the education and retention of students.” Librarians, as teachers and counselors, address student needs on a daily basis. Through their observation of and interaction with students, they are aware of deficiencies in student skills that may be indicative of high-risk students. Smalls (1987) observed that library “services can provide a diverse and personalized approach to meeting differences in information-processing capabilities and ability levels of students.” She believes that programs designed to meet individual needs and abilities are essential to effective retention strategies.

Wilden (1990) identified library employment as a strong incentive to academic success and student retention. This relationship between library work–study and retention was confirmed by Rushing and Poole’s (2002) research on the impact of library employment on student persistence which concluded that “connectedness to the institution is seen as the most important factor in student retention.”

**Data and Methodology**

Library expenditure, FTE student enrollment, and professional staff data used in this analysis were obtained from two sources: ARL Statistics: 2002–03 contains data compiled from member libraries of the Association of Research Libraries (ARL). Statistics have been collected and published annually for members of ARL since 1961–1962. Prior to 1961–1962, annual statistics for university libraries covering the years 1907–1908 through 1961–1962 were collected first at the University of Minnesota and later at Princeton University. The entire data series represents the oldest and most comprehensive continuing library statistical series in North America.

Academic Library Trends and Statistics: 2003 represented the sixth year that the Association of College and Research Libraries (ACRL) endeavored to provide timely data
on academic library management on an annual basis. The ultimate goal of the publication is to represent libraries from all institutions of higher learning in the United States and Canada. ARL supports *Academic Library Trends and Statistics* by providing permission for ACRL to utilize the *ARL Statistics* survey instrument for data collection and by providing full-access to ARL statistics data for inclusion in *Academic Library Trends and Statistics*. Institutions represented in this data compilation were assigned by ACRL to one of four Carnegie Classifications (i.e., Associates, Bachelors, Masters, or Doctorate) based upon information provided by the Carnegie Foundation for the Advancement of Teaching through a spreadsheet available on their Web site.

The Carnegie Foundation released a new version of its basic classification in 2005 (June, 2006). The extensively revised framework currently includes subcategories for two-year colleges, as well as three subcategories of doctoral-granting institutions, rather than two. Nearly all subcategories have new names and have been expanded, while the methodology behind some of the categories has changed.

In preparing *Academic Library Trends and Statistics*: 2003, ACRL did not classify individual institutions by subcategories. Therefore, the Carnegie Foundation’s modification of subcategories had no impact upon the analysis undertaken in this study. The revision of the classification system did result, however, in the reclassification of several institutions included in the study from the category of master’s colleges and universities to either doctoral-granting institutions or baccalaureate colleges. In spite of these reclassifications, the earlier 2000 version of the Carnegie Classification as applied by ACRL was used for this study. This was done to link the 2002–2003 academic year missions of the institutions to the data collected during the same time period.

Fall-to-fall retention rates were obtained from the Integrated Postsecondary Education Data System (IPEDS) of the National Center for Education Statistics (NCES). NCES is the primary federal entity for collecting and analyzing data that are related to education in the United States. IPEDS, the core postsecondary education data collection program for NCES, is a system of surveys designed to collect data from all primary providers of postsecondary education.

Since retention data for Canadian postsecondary institutions are not provided by IPEDS, Canadian libraries included in *ARL Statistics* and *Academic Library Trends and Statistics* were eliminated from the data used for this analysis. Institutions which did not report enrollment, expenditures, or retention rates were also eliminated. This resulted in a total study population of 586 institutions or 47 percent of the population represented in the ARL/ACRL publications.

Institutional expenditure per student for each category of expenditure was calculated. The specific expenditure categories analyzed were total library expenditures, total library materials, monographs, serials, and professional salaries. Data were equalized on a per student basis to minimize the effect of institutional size. This intermediary step was not performed for professional library staff data due to the small number of staff compared to the size of an institution’s student population.

Correlations between expenditure data per student and retention rates were determined by calculating Pearson correlation coefficients for each category of library expenditure within each Carnegie Classification using Statistical Package for the Social Sciences (SPSS) software. Levels of significance were also ascertained. Coefficients of determination were calculated to identify the percentage of variance in student retention rates that is explained by library expenditures. Similar analyses were performed to investigate the relationship, if any, between the number of professional library staff and retention rates.

### Analysis of Data

The values of *r*, the correlation coefficient, calculated for reported library expenditure categories of total expenditures, total library materials, monographs, serials, and professional salaries are displayed in Table 1. The significance of the correlation coefficient indicates the degree, direction, and significance of the relationship between the individual expenditure category and student retention.

Using the rules of thumb for interpreting bivariate correlation coefficients and coefficients of determination in Hamilton’s *Modern Data Analysis*, the absolute value of each correlation coefficient calculated, ranging from *r* = +.255 to *r* = +.597, indicates relationships between the various expenditure categories and student retention that may be interpreted as

### Table 1

<table>
<thead>
<tr>
<th>Total Library Expenditures</th>
<th>Total Library Materials</th>
<th>Monographs</th>
<th>Serials</th>
<th>Professional Salaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>0.453</td>
<td>0.487</td>
<td>0.393</td>
<td>0.460</td>
</tr>
<tr>
<td>Bachelor of Arts</td>
<td>0.505</td>
<td>0.569</td>
<td>0.461</td>
<td>0.597</td>
</tr>
<tr>
<td>Master of Arts</td>
<td>0.318</td>
<td>0.440</td>
<td>0.331</td>
<td>0.412</td>
</tr>
<tr>
<td>Doctoral</td>
<td>0.476</td>
<td>0.467</td>
<td>0.365</td>
<td>0.436</td>
</tr>
</tbody>
</table>

All correlations are significant at the 0.01 level.

### Table 2

<table>
<thead>
<tr>
<th>Total Population</th>
<th>Bachelor of Arts</th>
<th>Master of Arts</th>
<th>Doctoral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional staff</td>
<td>0.414</td>
<td>0.458</td>
<td>0.231</td>
</tr>
</tbody>
</table>

All correlations are significant at the 0.01 level.
either weak (from $r = +.2$ to $r = +.49$) or moderate (from $r = +.5$ to $r = +.79$). Moderate relationships with student retention were indicated between total library expenditures ($r = +.505$), total library materials ($r = +.569$), and serials ($r = +.597$) for those institutions categorized within the Carnegie Classification System as baccalaureate colleges. The positive signs of all correlations calculated indicate that expenditure and retention variables are directly related.

The level of significance of 0.01 for all correlation coefficients calculated indicates a significant positive correlation in each case. There is only one chance in 100 that each type of library expenditure and student retention is not related in the population. Thus, the null hypothesis, the hypothesis stipulating there is no significant relationship between the two variables, can be rejected with confidence knowing that the chance of Type I error, rejection of the null hypothesis even though it is true, is low.

The correlation coefficients calculated for number of professional staff are displayed in Table 2. The absolute values of all correlation coefficients calculated, with the exception of that derived for those institutions categorized within the Carnegie Classification System as doctoral-granting institutions ($r = +.536$), indicate weak relationships. A significant positive correlation was discovered to exist in all cases.

A significant correlation between variables does not imply causality. $R$-squared ($r^2$), the coefficient of determination, identifies the percentage of shared variance, or proportion of variance, in the dependent variable that is explained by the values of the independent variable. In other words, $r^2$ indicates how much influence the independent variable has on the dependent variable. In bivariate analysis, such as that undertaken in this investigation, the coefficient of determination is merely the square of the correlation coefficient.

Coefficients of determination for library expenditures are displayed in Table 3. $R$-squared values calculated, ranging from $r^2 = 0.065$ to $r^2 = 0.324$, indicate relationships that may be interpreted as either weak (from $r^2 = 0.04$ to $r^2 = 0.24$) or moderate (from $r^2 = 0.25$ to $r^2 = 0.64$). Moderate relationships with student retention were indicated between total library expenditures ($r^2 = 0.255$), total library materials ($r^2 = 0.324$), and serials ($r^2 = 0.356$) for those institutions categorized within the Carnegie Classification System as baccalaureate colleges. The significance value, or computed likelihood of committing a Type I error after rejecting the null hypothesis, for all coefficients of determination calculated was 0.000 ($p < 0.001$) allowing the conclusion that the results were statistically significant.

Coefficients of determination for number of professional staff are displayed in Table 4. $R$-squared values, with the exception of that derived for those institutions categorized within the Carnegie Classification System as doctoral-granting institutions ($r^2 = 0.287$), indicate weak relationships. The significance value calculated for each coefficient of determination revealed the results to be statistically significant.

**DISCUSSION**

Is there a relationship between library expenditures and student retention? How do they relate to one another? If any association does exist between the variables, is it strong?

Data analysis reveals that while statistically significant relationships exist between each category of expenditure and student retention within every Carnegie Classification, the strongest relationships exist between total library expenditures, total library materials expenditures, and serial expenditures at baccalaureate colleges. Costs incurred in each of these three expenditure categories explain 26 percent, 32 percent, and 36 percent of the total variation in student retention, respectively. These findings appear to be consistent with earlier studies that found providing quality library resources to students insures better academic performance and, in turn, leads to student persistence.

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Does any relationship exist between the number of library professional staff and student retention? If it does, how are the variables related and what is the strength of the relationship?

While statistically significant relationships exist between professional staff and student retention within each Carnegie Classification, the strongest relationship exists between these two variables at doctoral-granting institutions. Twenty-nine percent of the total variation in student retention is explained by the number of professional staff. The personalized service provided by academic librarians to meet the individual needs of students at doctoral granting institutions

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**Table 3**

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<th>Total Library Expenditures</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>0.205</td>
<td>0.237</td>
<td>0.154</td>
<td>0.211</td>
</tr>
<tr>
<td>Bachelor of Arts</td>
<td>0.255</td>
<td>0.324</td>
<td>0.212</td>
<td>0.356</td>
</tr>
<tr>
<td>Master of Arts</td>
<td>0.101</td>
<td>0.194</td>
<td>0.109</td>
<td>0.170</td>
</tr>
<tr>
<td>Doctoral</td>
<td>0.226</td>
<td>0.218</td>
<td>0.133</td>
<td>0.190</td>
</tr>
</tbody>
</table>

For all cases, Sig. = 0.000 ($p < 0.001$).

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may account for the relationship between library staff and student persistence.

**CONCLUSION**

This study demonstrates that library expenditures and professional staff have a significant positive effect on student retention. How can academic libraries maintain and expand their role in fostering student persistence?

As members of the academy, librarians can branch out into areas affecting the educational needs of students that extend beyond the confines of their traditional responsibilities. Participation in programs such as Project Success at Virginia Tech (Young, 2004) helps students that are struggling academically to achieve their educational goals and provides a means of developing relationships between students and faculty that can result in associations that continue throughout a student’s academic career. The more librarians interact with the university community, the greater their impact will be on student’s lives.

Physical space in libraries is being transformed to accommodate the technologies necessary for using library resources successfully. Student demand is increasing for access to information in multiple formats and the productivity hardware and software that can be used to incorporate that information into a finished product and foster “knowledge creation.” This increased reliance on technology, as well as the shift towards cooperative learning and group study, has led libraries to adopt the idea of an Information Commons. Numerous libraries are funding and experimenting with various combinations of information resources, technologies, and research assistance (MacWhinnie, 2003). The availability of professional librarians for research assistance as part of these efforts to offer integrated services in a 24/7 digital environment provides students with the guidance they need to achieve academic success.

Despite the availability of continuous electronic access to information resources, students continue to demand increased library hours to avail themselves of quiet study space, facilities for group study, and social space for meeting with fellow students between classes. In coming years, these features may increase in importance as remote access to information and instruction isolates users.

Many of today’s students with full-time jobs and outside commitments, such as families, are more likely to do their library research at home, either before or after normal business hours. For such students, extended hours of reference service are critical. Through alternative service formats such as chat reference, libraries are meeting learner’s immediate needs for reference assistance. Many libraries are also utilizing technologies to provide electronic delivery of interlibrary loan materials. Such services benefit not only non-traditional students and distance learning students, but traditional on-campus students as well by accelerating delivery time and allowing users to submit and track requests online (Viggiano, 2003).

Through use of measures of association and other performance indicators, library administrators can demonstrate the academic library’s positive impact upon institutional outcomes. Such evaluative techniques may also be used to identify areas where use of limited economic resources may have the greatest impact. Analyses, such as measures of association, can be used to provide clear evidence of the considerable value of academic libraries to the communities they serve and demonstrate that libraries provide environments that integrate resources and services that meet student needs and facilitate their academic success.

**NOTES AND REFERENCES**


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**Table 4**

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Professional staff</td>
<td>0.171</td>
<td>0.210</td>
<td>0.054</td>
</tr>
</tbody>
</table>

For all cases, Sig. = 0.000 (p < 0.001).


