

An Empirical Study on the Relationship Between University Library Use and Student Learning Outcomes: Based on the 2017 Beijing College Student Experience Survey Postprint

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Abstract

[Purpose/Significance] The utilization status of university libraries and its impact on student learning outcomes constitute a crucial aspect of library effectiveness evaluation. How universities can enhance the level of library support for student learning activities, and how students themselves can improve their ability to utilize libraries, represent the value and significance of this study. [Methods/Process] Based on the “2017 Capital College Student Experience Survey,” this study employs methods including t-tests, one-way ANOVA, correlation analysis, and regression analysis to examine the current status of university library utilization and its influence on student learning outcomes. [Results/Conclusions] The results indicate that different student groups exhibit varying degrees of library utilization. Library utilization demonstrates a significant positive correlation with student academic achievement, satisfaction with school, and learning gains, and it influences student learning outcomes. Based on these findings, it is recommended that universities strengthen guidance for student groups with poorer library utilization, such as lower-grade students and rural students; libraries themselves should enhance their comprehensive capabilities, improve the quality of information services, and strengthen resource development including library learning spaces, professional librarian teams, and student information literacy education; university students themselves should enhance their awareness and ability to utilize library resources.

Full Text

Preamble

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Empirical Study on the Relationship Between University Library Utilization and Student Learning Outcomes

—Based on the “2017 Capital College Student Experience Survey”

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Abstract

[Purpose/Significance] The utilization of university libraries and their impact on student learning outcomes constitute an important aspect of library effectiveness assessment. This study addresses how universities can enhance library support for student learning activities and how students themselves can improve their ability to utilize library resources.

[Method/Process] Based on the “2017 Capital College Student Experience Survey,” this study employs t-tests, one-way ANOVA, correlation analysis, and regression analysis to examine the current state of university library utilization and its influence on student learning outcomes.

[Result/Conclusion] Results show that different student groups exhibit varying degrees of library utilization. Library utilization is significantly positively correlated with academic performance, school satisfaction, and learning gains, and it demonstrably affects student learning outcomes. Based on these findings, we recommend that universities strengthen guidance for student groups with lower library utilization, such as underclassmen and rural students. Libraries themselves should enhance their comprehensive capabilities, improve information service quality, and strengthen resource development including learning spaces, professional librarian teams, and student information literacy education. University students must also enhance their awareness and ability to utilize library resources.

Classification Number: G642

Keywords: university library utilization, learning outcomes, student development, quality assessment

University libraries are important venues for educational activities and student learning, representing a crucial component of university educational resources. With the transformation of teaching and learning paradigms driven by internet and new media technologies, questions have arisen about library functions and their role in talent cultivation. This study analyzes current university library utilization from both process and outcome dimensions: First, what is the current state of library utilization among college students? Second, how

does library utilization affect student learning outcomes? How can universities enhance library support for student learning activities, and how can students improve their ability to utilize libraries? These questions constitute the value and significance of this research.

1 Literature Review and Conceptual Definitions

1.1 Literature Review

This literature review examines three areas: student library utilization, student learning outcomes, and the relationship between them.

International Research: Studies on the relationship between university library utilization and student learning outcomes abroad have a history of over 50 years. In 1964, R.C. Nichols found no significant correlation between per capita book holdings, library area, and GRE scores [?]. In 1966, G. Lane proposed measuring the impact of libraries on undergraduate educational outcomes [?], after which many researchers continued exploring this field. M. Oakleaf et al. argued that university library value should be examined from multiple perspectives, including library impact, input-output relationships, user satisfaction, and utilization patterns [?]. From the perspective of how students use libraries, student utilization includes information literacy education [?], seeking academic support from professional librarians [?], and diverse, specific demands for library space usage.

Regarding student learning outcomes, S. Otter defined them as what learners know or can do as a result of learning [?]. G.D.E. Kuh et al. proposed the concept of student success, encompassing scientific literacy, writing, quantitative analysis, critical thinking, as well as achievements in self-awareness and social skills, presenting multiple dimensions [?]. Xiao Yi, in reviewing international research on library impact, noted that learning outcome assessments include professional knowledge, general knowledge, emotional processing ability, critical thinking, and self-study habits [?].

Concerning library impact on learning outcomes, R.R. Powell argued that academic libraries must demonstrate their influence on educational outcomes to secure institutional funding [?]. E. Whitmire found that richer library resources in research universities correlate with higher critical thinking scores [?]. In 2016, J.K. Stemmer and D.M. Mahan used the “I-E-O” (Input-Environment-Output) model, finding that the relationship between library utilization and academic outcomes largely depends on how students use libraries and their willingness to adapt to new environments [?].

Domestic Research: Domestic research began later and focuses on: (1) Studies on library utilization patterns, including how students use resources (borrowing, journals, electronic resources, databases, services, spaces, and seeking librarian assistance) [?, ?]. Current utilization status has been examined in multiple student experience surveys. Huang Qiongcu’s survey of a Shanghai

university found moderate-to-low utilization rates, with females using libraries more than males and seniors showing highest utilization [?]. Ran Jing's survey of 1,358 students across 8 Hunan institutions found low frequency of library use for research or study [?]. Yang Zhaoxia's 2015 survey of 479 Yunnan University undergraduates found library utilization scores below theoretical averages [?], indicating unsatisfactory resource utilization. Hu Wanshan's 2017 survey of over 4,000 students in 13 Beijing municipal universities concluded that library learning activity quality was low, with the library's "physical" significance as a learning space being less than its "virtual" significance [?].

- (2) Research on learning outcome connotations. In library effectiveness assessment, Wu Yingmei et al. included course grades as an indicator [?]. Xu Yun et al. defined learning outcomes as including professional knowledge, comprehensive literacy, retrieval ability, self-problem-solving, and self-learning ability [?]. In higher education evaluation, Zhao Lin et al. proposed that learning outcomes should encompass two aspects: school satisfaction and self-reported learning gains [?].
- (3) Studies on the library utilization-learning outcomes relationship. In 1982, Gai Shitian and Huo Canru found that students with higher borrowing volumes had better academic performance [?]. In 1991, Liu Xi analyzed the relationship between academic performance and book borrowing at Gansu Agricultural University [?]. In 1996, Zou Shengwei and Yu Peiguo's random sample survey at Southwest Institute of Technology found positive correlation between borrowing frequency and average course grades [?]. In 2010, Xu Yun et al.'s survey of two grades at Guilin Medical University found that satisfaction with library utilization content was an important factor affecting the translation of library use into learning gains [?]. In 2014, Wu Yingmei et al.'s survey of Beijing Normal University students found significant positive correlations between academic performance and library utilization frequency, library visits, and electronic resource usage [?]. Wang Ling [?] used data on library entry frequency and semester grades from Capital Medical University students to explore these relationships, finding positive correlation between library utilization and academic performance, with variations by major, gender, and academic stage.

These domestic and international studies provide comprehensive analysis of library utilization patterns, learning outcome connotations, and their relationships. However, domestic research has limited data collection indicators for core concepts, requiring deeper exploration. Therefore, this study examines current library utilization patterns and characteristics, and analyzes how library utilization affects student learning outcomes.

1.2 Conceptual Definitions

Based on the established "Chinese College Student Experience Questionnaire (CCSEQ)," this study defines core concepts from the questionnaire's theoretical

framework and structured dimensions, referencing relevant literature.

1.2.1 Library Utilization: This study conceptualizes college student library utilization across five dimensions: (1) self-study space, (2) seeking help from librarians or staff, (3) retrieval and database usage, (4) course-related literature utilization, and (5) evaluating information quality. These align with indicators summarized by Wu Yingmei, Xiao Yi, and others.

1.2.2 Learning Outcomes: This study defines learning outcomes as comprising three aspects: (1) Academic performance, primarily referring to course grades during enrollment; (2) School satisfaction, a focal topic in higher education research influenced by personal background, institutional investment, and individual engagement [?], with libraries often serving as iconic campus buildings and important learning environments that impact satisfaction; and (3) Learning gains, including overall gains and five sub-dimensions: personal development, general knowledge, science and technology, career preparation, and intellectual development.

2 Research Design

2.1 Research Approach and Methods

This study focuses on two aspects: (1) Analyzing current library utilization patterns using descriptive analysis, t-tests, and one-way ANOVA; and (2) Examining relationships between library utilization and learning outcomes using correlation and regression analysis. While many factors influence learning outcomes, this study focuses specifically on library utilization. In regression analysis, based on established questionnaire dimensions, we first control for student background, course learning, writing activities, faculty interaction, peer interaction, club participation, and campus environment support to explore whether library utilization enters the regression equation. Second, without controlling other variables, we analyze how specific library utilization indicators affect learning outcomes. The research framework is shown in [Figure 1: see original paper].

2.2 Data Sources and Research Tools

Data come from the “2017 Capital College Student Experience Survey,” using four questionnaire sections: background information, library utilization, school satisfaction, and learning gains, forming a library utilization scale based on learning outcomes. Background information includes 8 items: gender, grade, etc. Library utilization includes 5 items: using the library as a study space, seeking librarian assistance, retrieval and database usage, course-related literature utilization, and evaluating information quality. School satisfaction includes 2 items: “Do you like your school?” and “If you could start over, would you choose your current school again?” Learning gains include 18 items across 5 dimensions.

The survey targeted undergraduate students in Beijing’s public regular higher

education institutions. Conducted in cooperation with the Beijing Municipal Education Commission's Higher Education Department and university academic affairs offices, the survey employed stratified sampling based on university administrative affiliation (municipal vs. central), type (comprehensive, science/engineering, liberal arts, arts), major type, and grade level, aiming for approximately 5% of each institution's enrollment. A total of 12,076 questionnaires were distributed, with 11,897 returned. After SPSS data cleaning—excluding graduate students, respondents with uniform answers, and those with excessive missing data—10,476 valid samples remained. After further screening for missing library utilization items, 9,268 valid samples were obtained for this study. Sample distribution is shown in .

2.3 Reliability and Validity Analysis

2.3.1 Reliability Analysis: Cronbach's Alpha coefficient measured internal consistency. The overall scale $\alpha = 0.938$; "Library Use" subscale $\alpha = 0.811$; "Learning Gains" subscale $\alpha = 0.952$ (sub-dimensions ranged 0.852-0.910); "School Satisfaction" subscale $\alpha = 0.692$ (acceptable). These results indicate good reliability, detailed in .

2.3.2 Validity Analysis: For content validity, the scale derives from the mature, adapted U.S. "College Student Experiences Questionnaire," adequately reflecting library utilization and learning outcomes. For construct validity, exploratory factor analysis with orthogonal varimax rotation and principal component analysis was conducted. Bartlett's test of sphericity showed overall KMO = 0.955 (Sig = 0.00 < 0.05), with "Library Use" KMO = 0.832 and "Learning Gains" KMO = 0.961, and all component loadings > 0.6, indicating good validity.

2.4 Research Hypotheses

Hypotheses include: (1) Current college students demonstrate low library utilization; (2) Different student groups show significant differences in library utilization; and (3) Library utilization positively affects academic performance, school satisfaction, and learning gains.

3 Empirical Findings and Analysis

3.1 College Student Library Utilization

3.1.1 Descriptive Analysis of Library Utilization: The "Library Utilization" scale comprises 5 items rated 1 (never), 2 (occasionally), 3 (often), and 4 (very often), with 2.5 as the theoretical midpoint indicating "average" utilization. As shown in [Figure 2: see original paper], the overall mean is 2.26, below the theoretical midpoint. Four specific utilization items range 1.72-2.38, below the midpoint, with only "study space" at 2.60 above midpoint, indicating generally poor utilization. "Seeking professional librarian help" is significantly lower

than the overall mean (t-test confirmed significant difference), representing the poorest utilization. Using the library as a study space exceeds the theoretical midpoint, representing the best-utilized function.

3.1.2 Differences in Library Utilization Across Student Groups: Independent samples t-tests and one-way ANOVA examined differences by gender, student leadership status, graduate school intention, grade level, hometown origin, and institution type. Results appear in .

Gender: No significant overall difference ($t = -0.404$, $P > 0.05$). Males and females showed no difference in retrieval/database usage, but females used the library more frequently as a study space and for course-related literature, possibly due to more participatory learning styles and superior learning strategies [?].

Student Leadership: Student leaders showed significantly higher utilization across all indicators ($t = 12.416$, $P < 0.01$), consistent with their higher overall engagement.

Graduate School Intention: Students intending to pursue graduate studies showed significantly higher utilization ($t = 9.643$, $P < 0.01$), particularly using the library as a primary preparation space.

Grade Level: Significant differences existed across four grades ($F = 79.614$, $P < 0.01$), increasing progressively: seniors > juniors > sophomores > freshmen, consistent with findings that seniors show highest utilization [?]. This reflects upperclassmen's greater learning autonomy, internal motivation, and use of inquiry-based, reflective, and integrative learning approaches [?].

Hometown Origin: Urban students utilized libraries more than rural students ($F = 4.528$, $P < 0.05$). While no differences existed in seeking librarian help or database usage, urban students used libraries more as study spaces and for course literature. Rural students showed poorer performance in these areas despite having strong learning efficacy and motivation [?], indicating need for targeted guidance to promote equity.

Institution Type: No significant overall differences existed among first-class university construction institutions, first-class discipline construction institutions, and regular institutions ($F = 1.331$, $P > 0.05$). However, specific indicators showed: (1) No differences in evaluating information quality; (2) For study space, database, and course literature usage: first-class universities > first-class disciplines > regular institutions; (3) For seeking librarian help: first-class universities < first-class disciplines < regular institutions. Central ministry-affiliated university students showed higher overall utilization than municipal university students ($t = -5.246$, $P < 0.01$), though municipal students sought librarian help more frequently. First-class and ministry-affiliated institutions likely benefit from greater national support and more selective student populations with higher autonomous learning investment.

3.2 How Library Utilization Affects Student Learning Outcomes

3.2.1 Correlation Analysis: Bivariate correlation analysis examined relationships between library utilization and academic performance, school satisfaction, and learning gains (see). All correlations were significantly positive, indicating that higher library utilization correlates with better outcomes across all three dimensions.

3.2.2 Regression Analysis: Two models were tested. Model 1 controlled for background, course learning, writing activities, faculty interaction, peer interaction, club participation, and campus environment support. Model 2 examined library utilization indicators without controls.

Model 1 Results: Library utilization significantly affected academic performance ($P < 0.01$), school satisfaction ($P < 0.05$), and total learning gains ($P < 0.01$), confirming causal relationships.

Model 2 Results: - **Academic Performance:** Adjusted $R^2 = 0.039$, with study space showing the strongest effect ($\beta = 0.084$). Seeking librarian help (Sig = $0.074 > 0.05$) and evaluating information quality (Sig = $0.795 > 0.05$) showed no significant effect. - **School Satisfaction:** Adjusted $R^2 = 0.022$, with seeking librarian help showing the strongest effect ($\beta = 0.057$). Database usage did not enter the equation (Sig = $0.449 > 0.05$). - **Learning Gains:** Adjusted $R^2 = 0.159$. Evaluating information quality showed the strongest effect on total gains ($\beta = 0.104$). For sub-dimensions: evaluating information quality most strongly affected personal development, science/technology, and intellectual ability ($\beta = 0.104, 0.132, 0.114$ respectively); seeking librarian help most affected general knowledge ($\beta = 0.157$) but not personal development or intellectual ability; study space most affected career preparation ($\beta = 0.101$).

4 Conclusions and Implications

4.1 Conclusions

Overall Poor Library Utilization: The overall mean of 2.26 is below the theoretical midpoint, with only “study space” exceeding 2.5, indicating generally poor utilization.

Group Differences: No significant gender differences exist, but student leaders, those with graduate school intentions, upperclassmen, urban students, and students in first-class or ministry-affiliated institutions show better utilization. Universities should focus on underclassmen and rural students, promoting educational equity. Regular institutions must deepen their understanding of libraries’ value for student development and increase resource investment.

Impact on Learning Outcomes: (1) Higher library utilization correlates with better developmental outcomes, confirming positive relationships with academic performance [?, ?], school satisfaction, and learning gains. (2) Using the library as a study space most strongly affects academic performance. (3) Seeking librari-

ian help most strongly affects school satisfaction. (4) Evaluating information quality most strongly affects learning gains. (5) Different utilization aspects affect learning gain sub-dimensions differently.

4.2 Implications

4.2.1 Sustainable Library Development to Enhance Student Attraction

- (1) **Enhance Comprehensive Strength in “Double First-Class” Construction:** Library knowledge service capacity depends on cultural atmosphere, human resources, and management innovation [?]. Libraries should emphasize functions as learning platforms, practice platforms, and cultural guides to support “Double First-Class” construction [?].
- (2) **Strengthen Resource Development and Service Quality:**
 - **Improve Information Services:** As network technology develops and learning patterns change, students increasingly use databases and information services [?]. Libraries should strengthen internal development and external collaboration.
 - **Develop Learning Spaces:** Since study space usage is most frequent and significantly impacts academic performance and career preparation, spaces should promote deep learning and critical inquiry, dialogue-based academic learning, autonomous learning, and problem/project-based approaches [?].
 - **Build Professional Librarian Teams:** Librarian-student interactions affect information flow quality and student feelings, influencing learning behaviors and outcomes. Current low rates of seeking academic support indicate need for stronger librarian development.
 - **Enhance Information Literacy Education:** Targeted training is needed. Research shows many libraries lack regular training or personalized guidance [?]. Since information quality evaluation significantly impacts development but remains underutilized, librarians should collaborate with faculty to provide information literacy training integrated with coursework.

4.2.2 Students Should Proactively Enhance Library Utilization Awareness and Capacity

Library resource utilization requires student initiative. First, students must recognize libraries’ importance for comprehensive development. Second, they should understand how to match their needs with library functions. Finally, they should actively participate in library activities to enhance understanding, belonging, and utilization skills.

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Author Contributions:

Li Qingfeng: Determined measurement tools, organized survey sampling and data collection, established paper topic and structure, organized writing seminars, revised and finalized manuscript.

Wang Chao: Participated in data collection, conducted data analysis, drafted and revised manuscript.

Note: Figure translations are in progress. See original paper for figures.

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