MEASURING THE ACADEMIC IMPACT OF THE LIBRARY: EXPLORE THE RELATIONSHIP BETWEEN LIBRARY CIRCULATION PATTERN AND STUDENT ACHIEVEMENT IN THE FACULTY OF MEDICINE AND ALLIED SCIENCES (FMAS), RAJARATA UNIVERSITY OF SRI LANKA (RUSL)

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Abstract

Library circulation is an essential function of lending library materials to readers to enhance their knowledge and literacy beyond existence. It is strongly related to the purpose of the activity and the academic career goals. Libraries constantly strive to utilize the most suitable tools and techniques to efficiently manage the borrowing and lending of library materials. The study aims to investigate the relationship between students' library utilization and academic achievement in FMAS and RUSL. The sample consists of students who graduated from 2016 to 2019. The research employed the case study method to collect data through the Koha-integrated library management system. The graduated students' academic performance was collected from the university's annual convocation handbook. Collected data were analyzed using the regression analysis. The analyzed data unveiled a moderately positive significant relationship between library circulation and the performance of students who obtained First Class and Second Class Lower Division with correlation values of 0.96, and 0.95 respectively. These findings contribute to the understanding of how library resources and services impact students' academic achievement and how they will aid the library management in making decisions to enhance the library's learning resources and collection.

Keywords: *Academic impact of libraries, Student's performance, Library usage, Library circulation pattern*

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Introduction

Are libraries the centre of knowledge in today's world? Nowadays, libraries have transformed their existence into virtual libraries. Universities still consider libraries as their heart; technology has digitized the knowledge of the universe. Facilitating unrestricted access to knowledge is imperative for optimal learning outcomes. In particular, universities and libraries have a crucial role in moulding exemplary graduates by ensuring the availability of requisite academic resources and enabling easy accessibility.

Academic libraries have published studies that contribute to the world's knowledge by exploring and establishing connections between library usage and student achievement. According to Jara et al. (2017), libraries encountered several primary challenges, such as the growing need for accountability, financial limitations, increased demands from university stakeholders and users and the requirement for libraries to showcase their worth and impact on undergraduate success and university goals. Furthermore, they emphasized that the students specializing in medical and health sciences tend to utilize digital resources. Allison (2015) conducted research on evaluating the academic power of libraries. Allison highlighted a confident, positive connection between student library resource usage and their academic achievement as indicated by their GPAs (Grade Point Average). Thorpe et al. (2016) revealed that libraries need to articulate the significance of their services by considering their impact on student outcomes. Student persistence rates and GPAs are two outcomes that higher education institutions are particularly interested in. Additionally, Thorpe et al. pointed out that libraries have also implemented conventional business evaluation methods to assess the services. These kinds of methods include value-added assessment, analysis of return on investment and impact evaluation models. The Huddersfield University Library staff have found an unequivocal historical relationship between library usage and degree classification. This indicates that certain student groups utilize library facilities and resources less frequently than anticipated (Collins & Stones, 2014). According to Goodall and Pattern (2011), three sets of data were examined in their study: use of electronic resources, book loans and visits to the library.

Soria, et al, (2013) conducted a study that focused on the relationship between library use and undergraduate student outcomes, emphasizing new evidence for student retention and academic success. The data suggested that first-year students who utilized the library at least once during the fall semester achieved higher grade point averages than their peers who did not access the library during their initial semester. Additionally, they found that the usage of various library services by first-year students was linked to their academic success and

persistence in distinct ways. Specifically, four categories of library resources demonstrated marked and positive associations with students' academic achievement. These include utilizing library workstations (indicating physical utilization within the library premises), accessing online databases, accessing electronic journals and borrowing books. According to Cox and Jantti (2012), the University of Wollongong Library developed the Library Cube, an innovative database and reporting function that integrates library usage data with student data, incorporating demographic details and academic performance information. Upon analyzing this combined dataset, a significant correlation emerged between students' grades and their utilization of the information resources offered by the library. It was possible to consolidate findings from numerous institutions to assist universities in benchmarking their own performance and usage. However, achieving this would necessitate a certain level of collaboration and standardization. A study discovered that students studying particular disciplines at Huddersfield exhibit distinct library usage patterns compared to students in the same disciplines at other institutions (Collins & Stones, 2014). Jara et al. (2017) have expressed that a correlation exists between access to digital resources and the borrowing of print materials. Students who avail digital resources are more inclined to borrow print materials and tend to have a higher average of print material loans compared to those who do not access digital resources. Additionally, research findings indicate that this relationship varies depending on the discipline being studied. Thorpe et al. (2016) indicated a correlation between students' utilization of the library and improved GPAs and higher retention rates. These findings illustrated the significance of the academic library to stakeholders and thereby support the integration of library services into course curricula. Lonsdale (2003) mentioned that research over the past five or six decades has consistently shown a positive relationship between student achievement and school libraries. Whitmire (2002) revealed that, although undergraduates' age was not related to library use, gender and race were related to library use and several college experiences positively correlated to their library use and performance. Cherry et al. (2013) highlighted the usage of electronic resources and GPA is positively correlated for some populations. It also provided persuasive evidence of the library's contribution to students' academic success. Academic institutions prioritize the augmentation of their physical and digital resource collections.

FMAS Libraries

The Faculty of Medicine and Allied Sciences (FMAS) at the Rajarata University of Sri Lanka (RUSL) features two libraries tailored to the needs of medical students and

healthcare professionals in the North-Central Province. The faculty is situated in the Saliyapura and the Professorial Unit within the Teaching Hospital, Anuradhapura. Since 2017, the Professorial Unit Library has served as a resource centre for the Postgraduate Institute of Medicine (PGIM) of the University of Colombo in Sri Lanka. The Professorial Unit Library and the Faculty of Medicine and Allied Sciences Library arrange for medical students with access to valuable resources and are open on weekdays from 8.30 a.m. to 10.00 p.m. and on weekends from 8.30 a.m. to 5:00 p.m., excluding Poya days. Over one thousand students have availed themselves of these libraries, with 14 batches of students having already benefitted from the resources offered at the FMAS libraries.

The Medical Faculty Library utilizes Koha - an open-source library management software to facilitate the efficient circulation of library materials. Each batch consists of more than 200 students and most of the students register at the library. Medical students tend to "read" more borrow books and access electronic resources. The Koha database includes library users' demographic information, circulation history, books and journals and their locations. The assets of the library are more than 11000 medical textbooks, e-books, journals, periodicals, electronic databases, past examination papers and lecture notes. The libraries at the Professorial Unit and Faculty of Medicine are both equipped with computer facilities. The FMAS library receives an annual allocation of more than two million from the University for the purchase of books and journals. Additionally, the library receives approximately Rs. 300,000.00 worth of books each year from the Sri Lanka Medical and Dental Association (SLMDA) in the United Kingdom as a generous donation. Furthermore, the university generally spends 600 hours of overtime per month for both libraries. PGIM library reimburses internet bills worth Rs.8870.00 monthly and spends Rs.5000.00 monthly as a 'topping up' allowance for the Professorial Unit Library. Hence, FMAS libraries are equipped with relevant resources and facilities for the betterment of students and health professionals.

Students' Performance and Library Circulation

Academic performance at universities is measured primarily through exams, presentations and assignments, but the burden of enhancing student performance rests heavily on the shoulders of library systems. However, assessing the impact of library usage on academic progress poses a unique challenge, as it cannot be measured directly. The key indicators for evaluating the efficacy of libraries include the degree of resource utilization and the frequency of library visits.

Academic performance refers to evaluating students' achievements in different academic subjects. Teachers and educational authorities commonly assess achievement through classroom performance, graduation rates, and outcomes from standardized tests. Performance outcome indicates which students had accomplished specific goals. This research uses graduation books of the graduate students to obtain students' performance where records of attainment of Gold medals, First Class, Second Class Upper Division and Second Class Lower Division are mentioned.

In this study, the researcher aimed to address the existing knowledge gap regarding the contribution of the library to student achievement within the medical faculty. By investigating how the library impacts student outcomes, this research aims to shed light on the important role that libraries play in supporting students' academic success of students in the medical field. The researcher uses students' library circulation history taken from the Koha-integrated library system for measuring library usage. The term "library circulation" refers to the process of managing the borrowing and returning of materials within a library. It involves the movement of books, magazines, DVDs and other resources from the library's shelves to patrons who wish to use them and then back to the library's collection once they are returned. The circulation system typically includes checking out materials, setting due dates, renewing loans, and handling fines for overdue items. Library circulation ensures that library resources are available for use by patrons, tracks the whereabouts of items and maintains an organized and efficient borrowing system for the library's collection (Lisedunetwork, 2018). In this case, the circulation patterns of books were measured using the Koha software in the Medical Faculty Library.

The researcher focused exclusively on graduate students within the faculty who achieved First Class, Second Class Upper Division and Second Class Lower Division classifications as a measure of their performance. Non-accessibility of students' GPAs to evaluate their academic achievement due to administrative constraints was a limitation of the study.

Objectives

The main objective of the study is to explore whether there is a relationship between student library usage and their academic performance during the period of 2016 - 2019.

Methodology

This study employed a quantitative methodology, utilizing secondary data from multiple sources. The data was gathered from the RUSL integrated library management system and a list of graduands published annually by the RUSL during their general convocation ceremony. The study focused on the population of medical students who graduated from 2016 to 2019, as indicated in the lists of graduands while the sample comprised students who achieved First Class, Second Class Upper Division and Second Class Lower Division passes. As the study aimed to explore the relationship between library circulation patterns and students' academic achievement, the independent variable was the students' library circulation pattern, while the dependent variable was their academic achievement. The study measured students' circulation patterns based on the number of books issued to students. At the same time, their academic performance was assessed in terms of the class passes obtained by the students. The data mentioned were analyzed using the regression analysis. Ethical approval for this research was obtained from the Ethical Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka.

Results and Discussion

The Faculty of Medicine and Allied Sciences at Rajarata University of Sri Lanka admitted its first batch of students (2005/2006), in 2007. However, sufficient facilities available were not available for the library since 2009. The first batch of medical students passed out in the year 2013. In 2009, the Library implemented the Koha–integrated library management system but it was not fully operational until 2015. As such, data collection for the present study began in 2016 and onwards. The basic details of the population are presented in Table 1.

Table 1: Basic Details

Year of Graduation	Academic Year	No. of Students	No Registered in the Library
2016	2008/2009	184	104
2017	2009/2010	180	135
2018	2010/2011	180	155
2019	2011/2012	210	181

Source: Faculty Handbook and Library Registration Book

According to the lists of graduands, their academic performance along with library circulation, are mentioned in Table 2.

Table 2: Gold Medalists and Their Library Circulation

Category	Library Circulation			
Gold Medal /Students Achievement	**2016**	**2017**	**2018**	**2019**
Best performance in Physiology	0	11	63	59
Best performance in Biochemistry	2	99	63	11
Best performance in Anatomy	0	2	63	94
Best performance in 2ⁿᵈ MBBS Examination	0	2	63	11
Best performance in Microbiology	2	26	63	13
Best performance in Parasitology	17	0	63	2
Best performance in Community medicine	2	22	0	0
Highest aggregate in Community medicine	0	26	63	0
Most outstanding performance in Community medicine	0	13	79	31
Best performance in Forensic medicine	51	26	211	17
Best Performance in Pathology	17	4	28	13
Best performance in Pharmacology	0	4	60	22
Best performance in Medicine	0	0	5	45
Best performance in Pediatrics	17	40	63	59
Best performance in Surgery	0	22	57	1
Best performance in Obstetrics and Gynecology	17	4	43	0
Best performance in Psychiatry	0	0	0	34
Overall best performance in 3ʳᵈ MBBS examination	0	0	63	22
Best performance in the final MBBS examination	17	22	57	45

Source: Lists of Graduands 2016-2019

The achievements of the students each year, categorized into First Class, Second Class Upper Division and Second Class Lower Division are mentioned in Table 3

Table 3: Students' Academic Performance

Year	First Class	Second Class Upper Division	Second Class Lower Division
2016	1	11	40
2017	2	24	47
2018	4	28	66
2019	1	17	78

Source: Lists of Graduands 2016-2019

Researcher considered students' achievement of gold medals and class passes as their performance measurements. Table 4 shows library registration of graduates with class passes and Table 5 presents library circulation of class passes in terms of check-outs.

Table 4: Class Passes of Graduates and Library Registration

	First Class			Second Class Upper Division			Second Class Lower Division		
	Number of Students	Registered Library Users	%	Number of Students	Registered library Users	%	Number of Students	Registered Library Users	%
2016	1	1	100%	11	8	73%	40	29	73%
2017	2	2	100%	24	23	96%	47	44	94%
2018	4	4	100%	28	24	86%	66	46	70%
2019	1	1	100%	17	17	100%	78	74	95%

Source: Koha-Integrated Library Management System, RUSL

Table 5: Class Pass Graduate's Library Circulation

	First Class			Second Upper			Second Lower		
	Number of Students	Library Usage	Growth /Decline Rate	Number of Students	Library Usage	Growth /Decline Rate	Number of Students	Library Usage	Growth /Decline Rate
2016	1	17		11	131		40	213	
2017	2	44	159%	24	573	337%	47	1077	406%
2018	4	356	709%	28	1229	114%	66	1924	79%
2019	1	45	-87%	17	642	-48%	78	2168	13%

Source: Koha Integrated Library Management System-RUSL

Further, Figure 1 shows, a consistent growth in the circulation of books by undergraduates annually, with a decline observed in 2019 (potentially attributed to the temporary closure of libraries during the pandemic towards the end of 2019). It is important that graduate students with Second Lower Division confirmed a greater reliance on library books, which exhibited an annual increase in utilization during the year 2018. Furthermore, the usage of books by graduates was observed to be significantly high overall**.**
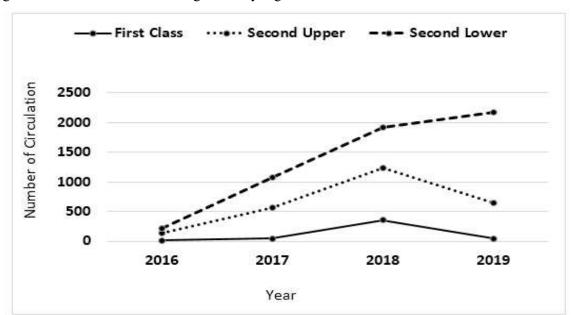

Figure 1: Library Circulation and Their Performances

According to Table 5 the annual rise in library usage among graduates showed a remarkable increase in 2017, with First Class graduates demonstrating an impressive growth rate of 159%. This upward trend continued in 2018, skyrocketing to an astonishing 709%. However, in a surprising turn of events, 2019 witnessed a significant decline of -87%. For

Second Class lower graduates, their library usage experienced a substantial surge of 406% in 2017, followed by a notable increase of 79% in 2018 and a slight increase of 13% in 2019.

When analyzing the library performance of Second Class Upper students, it is worth noting that they experienced steady annual growth rates in 2017 (+337%), 2018 (+114%) and 2019 (-48%). On the other hand, their counterparts in the First Class category achieved a promising increase of 100% in both 2017 and 2018, but encountered a setback in 2019 with a decrease of 25%. Turning our attention to Second Class Upper Division counterpart graduates, their performance exhibited positive growth in 2018 (+114%) and 2019 (+17%). However, this upswing reversed in 2019, with a decline of -39%. Lastly, counterpart graduates in the Second Class Lower Division experienced an annual increase of 18% in library performance in 2017, followed by a further rise of 70% in 2019. Unfortunately, this positive trajectory was interrupted in 2018, resulting in a slight decrease of 2%. The Gold medal receiving graduates also increased in year 2017 by 29% and in year 2018 it was remarkable increased rate was 159% however in year 2019 it was decreased by -21%.

According to the regression analysis for the relationship between library circulation pattern and the graduates (who obtained First Class) academic performance, the correlation coefficient for students who received first-class passes was 0.96. It indicates a strong positive relationship between library circulation and graduates' performance. The R-square value of 0.93 suggests that 93% of the variance in students' performance can be explained by library circulation. Additionally, the p-value of 0.048, which is lower than the common significance level of 0.05, indicates that the regression model is statistically significant.

Furthermore, the correlation coefficient for students who received Second Class Upper Division passes was 0.88. It indicates a positive relationship between library circulation and their performance. The R-square value of 0.78 suggests that 78% of the variance in students' performance can be explained by library circulation. However, the p-value of 0.114 indicates that the model is not significant.

Based on the findings, the correlation coefficient for students who achieved Second-class lower-division passes was 0.95, indicating a strongly positive relationship between library circulation and graduates' performance. The R-square value of 0.91 signifies that 91% of the variability ingratiates performance can be attributed to library circulation. Additionally, the p-value of 0.034, which is lower than the common significance level of 0.05, indicates that the regression model is statistically significant.

Conclusion and Recommendations

The analyzed data unveiled a moderately positive significant relationship between library circulation and the students' achievement in First Class and Second Class Lower Division within the Faculty of Medicine and Allied Sciences at Rajata University of Sri Lanka. These findings greatly enhance the comprehension of the influence that library resources and services wield on the academic performance of students. This newfound knowledge will assist library management in making informed decisions aimed at improving and enriching the library's learning resources and collection. Based on the above findings, the researcher makes the following recommendations:

1. Strengthen Library Resources: Given the significant positive relationship between library circulation and students' academic performance, it is recommended to allocate resources to enhance and diversify the library's collection. Acquiring more relevant and up-to-date materials, including books, journals, and online resources, will provide students with a wider range of resources to support their studies.

2. Improve Library Services: Together with expanding the collection, it is crucial to improve library services. This can be achieved by offering tailored training sessions and workshops to students, increasing access to research assistance, and providing guidance on utilizing library resources effectively. These initiatives will help students make the most of available resources and improve their academic performance.

3. Facilitate Access to Library Materials: It is vital to ensure that library materials are easily accessible to students. This can be accomplished by implementing a user-friendly system that allows for seamless borrowing and returning of materials, as well as enhancing the availability of electronic resources both on-campus and remotely. By removing barriers to accessing library materials, students will be more inclined to utilize these resources, leading to improved academic performance.

4. Conduct Periodic Assessments: To continue monitoring the impact of library resources and services on students' academic performance, regular assessments should be conducted. These assessments can include surveys, focus groups, and interviews to gather feedback from students about their experience with library resources and services. This feedback will help identify areas for improvement and guide future decision-making.

By implementing these recommendations, the university's library management can enhance the support provided to students, adopting an environment where library resources and services positively impact students' academic performance.

References

Allison, D. A. (2015). Measuring the academic impact of libraries. *Faculty publications, UNL Libraries*, (320). Retrieved from https://digitalcommons.unl.edu/libraryscience/320

Collins, A., & Stone, G. (2014). Understanding patterns of library use among undergraduate students from different disciplines. *Evidence-Based Library and Information Practice, 9*(3), 51-67

Cox, B. L., & Jantti, M. H. (2012). Discovering the impact of library use and student performance. *EDUCAUSE Review,* July 18, pp. 1-9. Retrieved from https://ro.uow.edu.au/asdpapers/492

Goodall, D., & Pattern, D. (2011). Academic library non/low use and undergraduate student achievement. *Library Management, 32*(3), 159-170. doi:10.1108/01435121111112871

Cherry, E., Rollins, S. H., & Evans, T. (2013). Proving our worth: The impact of electronic resource usage on academic achievement. *College & Undergraduate Libraries, 20*(3/4), 386-398. doi:10.1080/10691316.2013.829378

Jara, H., Clasing, P., Gonzalez, C., Montenegro, M., Kelly, N., Alarwn, Sandoval, A., Savrina, E. (2017). Pattern of library use undergraduate students in a Chilean University. *Portal: Libraries and the Academy, 17*(3), 595-615.

Lisedunetwork. (2018). Library Circulation Service. Retrieved from https://www.lisedunetwork.com/library-circulation-service/

Lonsdale, M. (2003). Impact of school libraries on student achievement: A review of the research: Report for the Australian School Library Association, Australian Council for Educational Research, 40p.

Soria, K. M., Fransen, J., & Nackerud, S. (2013). Library use and undergraduate student outcomes: New evidence for students' retention and academic success. *Portal: Libraries and the Academy, 13*(2), 147-164.

Thrope, A., Lukes, R., Bever, D. J., & He, Y. (2016). The impact of the academic library on student success: Connecting the dots. *Portal: Libraries and the Academy, 16*(2), 373-392. doi:10.1353/PLA.2016.0027

Whitmire, E. (2002). Academic library performance measures and undergraduates' library use and educational outcomes. *Library & Information Science Research, 24*(2), 107-128.