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Users Experience of Technology Integration on the Library Usage

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***Abstract*—** This study seeks to explore the multifaceted impact of user experience of technology integration on library usage. This study will look at how technology is used in our libraries, focusing on online databases, e-books, and Online Public Access Catalogs (OPAC). The study also identified several challenges faced by students in accessing electronic information resources. Reliable network connectivity, technical support, adequate seating, and sufficient financial backing are crucial in addressing these challenges and enhancing student engagement with technology. Respondents' experiences with technology assistance in the library, categorized into digitization, efficiency, and access, further highlight the benefits of digital resources in improving convenience and accessibility.

***Keywords*—** Technology Integration, User Experience, Library Usage, Online Databases, Electronic Information Resources.

INTRODUCTION

Libraries have always become an integral part of each community. They portrayed a gateway through which individuals can access the knowledge of their life and information in possession by all people, mostly children, youth, males, and females. Those very demands and expectations of people change in the process of digitalization, thereby giving great challenges to the libraries, that is, to be in line with the increasingly greater use of technology about how information is accessed, preserved, and shared. Libraries need to embrace information and communication technology in order to stay current and provide customers with value-added services. The conventional function of the librarian is evolving in the wake of the digital age and rapid technological innovation, which have made it easier and faster for individuals to access books and knowledge (Ryan, 2018).

Libraries may now offer a wide range of digital resources and services that are easily accessible to patrons from anywhere at any time thanks to ICT integration. This can comprise both electronic resources like e-books, online databases, and multimedia materials, as well as printed library goods like books and magazines. (Ogar, 2018).

Nowadays, a library is more than just a physical building with shelves of books and widely distributed magazines. In the current era, databases have made it simpler to access and retrieve information. Library websites facilitate the discovery and exchange of materials with a wider variety of information (Najwa, 2020). In this study, entitled "Users Experience of Technology Integration on the Library Usage," a number of significant gaps have been identified that need more investigation. Firstly, there is a need for a more comprehensive understanding of the diverse user demographics and their specific technological proficiency levels within the library context. Additionally, the existing literature lacks a thorough investigation into the effectiveness of various technology integration models and their impact on user satisfaction and engagement. Furthermore, a gap exists in exploring the evolving role of librarians in facilitating technology use, including their training needs and the challenges they face. Additionally, there is a lack of research examining the long-term effects of technology integration on information retrieval habits, learning outcomes, and overall user experience. Closing these gaps will contribute significantly to enhancing the design and implementation of technology in libraries, ultimately optimizing the user experience and the effectiveness of library services.

This study seeks to explore the multifaceted impact of user experience of technology integration on the library usage. From online catalogs and databases to e-books, and artificial intelligence-driven chatbots, libraries are embracing an array of digital innovations to meet the changing needs of their patrons. Consequently, these technological interventions have the potential to reshape

how individuals interact with library resources, spaces, and services. At Tagoloan Community College, we want to understand how people feel about using online databases, e-books, and the Online Public Access Catalog (OPAC) in the library. Using a computer or tablet to find books or information instead of flopping through pages. That's what we mean by databases and OPAC. E-books are like digital books that you can read on a screen. These changes are meant to make it easier for students to get the information they need.

By understanding how people experience these changes, we can make the library a better place for everyone. This study will look at how technology is used in our libraries, focusing on online databases, e-books, and OPAC. We want to find out what's working well and what can be improved. The goal is to make sure that as technology grows, our libraries stay helpful and enjoyable for everyone at Tagoloan Community College.

METHODS

The study used mixed research methods in the investigation of the users' experience of technology integration on library usage at Tagoloan Community College, focusing on specific aspects such as online databases, e-books, and OPAC. The ultimate aim is to propose an action plan for enhancing technology integration services based on the study findings. A combination of quantitative and qualitative research methods was used to find out the adequate and accurate interpretation of data as presented by numbers and themes to understand how people feel and what they do with technology in the library. The data were gathered through a survey questionnaire given to all students enrolled in Tagoloan Community College with a sample size of 2% of the total population of the college. The researchers used self-made survey questionnaire. It will undergo pilot testing to establish the validity and reliability of the questionnaires. To test the validity and reliability of the questionnaire, it will be checked by the adviser and also by the chairperson of research. One estimate of reliability is test-retest reliability. This involves administering the survey to a group of respondents and repeating the survey with the same group at a later point in time, which is through pilot testing. We then compare the responses at the two time points. The questionnaire is composed of two parts. The first part will contain demographic information about the respondents, such as their name (optional), age, grade level, and program. This information helps in understanding any potential correlations between users' experiences and their demographic characteristics. On the second part, respondents will be asked to rate their experience with various technological aspects of library usage, using the following scale to indicate their agreement with each statement. The researchers used descriptive and inferential statistics such as simple percentage and Pearson Product Moment Correlation in the analysis of data

RESULTS AND DISCUSSION

This study covered the respondents' profile; the extent of technology integration in library usage; the challenges encountered by the students in accessing the electronic information resources; significant relationship between the experience in technology integration and the respondent's challenges in terms of financial support in the library; and the respondents' experiences in the use of technology- assistance.

Respondents' Profile

The respondents' profile covered the age, year level, program and gender.

Age

The highest number of respondent's age is from 20-21 years old above with 86 (46.49%) and the lowest number of respondents is coming from 18-19 years old with 41 (22.16%) response rate. This means that majority of the respondents are in this age, considering that this age group is prevalent and many respondents are in in their early twenties. This aligns with findings from the Pew Research Center, which indicate that young adults, particularly those in their early twenties, are more likely to adopt and use technology extensively compared to their slightly younger peers (Lenhart et al., 2010)."

Respondent's year-level

It has been noticed that the highest number of respondent's year level is third-year students, who form the largest group of respondents with 61 (32.97%), suggesting higher engagement or availability among this group, while fourth-year students form the smallest group with 24 (12.97%), potentially due to their increased academic responsibilities or other factors. This means that 3rd year is the most engaged and the most accessible group for the survey. This pattern is consistent with findings from the EDUCAUSE Center for Analysis and Research, which indicate that engagement with technology and institutional resources varies across year levels, with a noticeable decline in the final year as students focus on capstone projects and transition out of academic life (Dahlstrom, Walker, & Dziuban, 2013).

Respondent's Program

The data shows that the highest number of respondent's program is from the Education (EDUC) program formed the largest group of respondents with 39 (21.08%), while students from the Library and Information Science (BLIS) program form the smallest group with 6 (3.24%). This trend is consistent with findings from the NMC Horizon Project, which indicate that students' engagement with technology and library resources varies significantly across different academic programs, with those in education-related fields often demonstrating higher engagement levels (Alexander et al., 2017).

Respondent's sex

About 98 respondents (52.97%) are female, it's because majority of female are participating than male, and 87 respondents (47.03%) are male. This gender distribution is consistent with findings from Sax et al. (2003), which indicate that female students are often more likely to participate in surveys and exhibit higher engagement with academic resources, including technology-integrated library services.

Extent of technology integration in library usage in terms of Online Database

As shown in the data, the highest mean value of the indicators in the respondents' experience of technology integration in library usage based on the online database is 3.10, which means that respondents agree with the statement, "The online database has improved my ability to find specific and relevant information efficiently". This high score indicates that respondents find the online database to be an effective tool for research, enhancing their ability to locate pertinent information quickly and accurately. This finding is supported by a study conducted by Madhusudhan (2010), which found that the effective use of online databases significantly improves the research experience of users. The study highlights that users benefit from the quick and easy access to a wide range of current and relevant information, which is essential for academic success. Furthermore, the ability to efficiently navigate and retrieve information from online databases boosts user confidence and satisfaction, leading to more frequent and effective use of these resources. The respondents appreciate the efficiency and convenience offered by the online database, confirming that technology integration in library services positively impacts their research capabilities and overall academic performance.

Extent of technology integration in library usage in terms of Online Public Access Catalog

The highest mean value of the indicators in the respondents' experience of technology integration on the library usage based on the OPAC (Online Public Access Catalog) system is 2.95 means that respondents agree with the statement, "I would recommend the use of the OPAC system to my fellow students for their academic searches." It indicates that respondents find the OPAC system beneficial and are likely to endorse its use to peers, reflecting high satisfaction with its performance and utility. This positive perception of the OPAC system is supported by a study conducted by Thanuskodi (2012), which found that the effective implementation of OPAC systems significantly enhances the user experience in academic libraries. The study indicates that OPAC systems provide accurate, current, and easily accessible information, which is crucial for academic research and efficient library usage. Furthermore, the convenience and user-friendliness of OPAC systems contribute to higher levels of user satisfaction and confidence in utilizing library resources. The overall mean of 3.89, which is interpreted as "Strongly Agree," underscores the substantial impact of the OPAC system on improving respondents' perception of library services. This suggests that technology integration, specifically through OPAC, plays a vital role in enhancing the effectiveness and efficiency of academic research and library resource management.

Extent of technology integration in library usage in terms of E-Books

As noticed the highest mean value of indicators in the respondents' experience of technology integration in library usage based on E-books is 2.97 means that respondents agree with the statement, "My entire learning experience is improved by the library's collection of E-books." It indicates that respondents find the E-books provided by the library to be significantly beneficial to their academic experience, enhancing their overall learning process. This finding aligns with a study by Lam & McNaught (2009), which found that the availability and accessibility of E-books in academic libraries play a crucial role in supporting students' learning and research activities. The study highlights that E-books offer convenient access to a wide range of academic materials, which is essential for effective study and research. The ease of access and the extensive selection of relevant titles contribute to an enhanced learning experience, as indicated by the respondents. The total mean of 2.87, interpreted as "Agree," suggests that the integration of E-books into the library's

resources positively influences the respondents' perception of the library. This demonstrates the importance of providing digital resources to meet the evolving needs of students and researchers in an increasingly digital academic environment.

The challenges encountered by the students in accessing the electronic information resources in terms of network

As presented, the mean highest mean value of the indicators in the respondents' experience of technology integration in library usage based on the network is 3.03 means that respondents strongly agree with the statement, “I am satisfied with the technical support provided for any network-related issues in the library.” It indicates that respondents find the technical support for network-related issues to be adequate, contributing to their overall satisfaction with the library's network services. This finding is consistent with a study by Johnson (2015), which emphasized the importance of reliable network connectivity in academic libraries. The study found that a dependable network infrastructure is essential for supporting various digital resources and services, including online databases, catalogs, and E-books. Adequate technical support for network-related issues ensures uninterrupted access to these resources, enhancing users' overall experience and satisfaction with library services. The total mean of 3.87, interpreted as "Strongly Agree," underscores the positive impact of network integration on respondents' perceptions of the library's services. It highlights the significance of a reliable and efficient network infrastructure in supporting academic research and study activities in the digital age.

The challenges encountered by the students in accessing the electronic information resources in terms of availability

The data shows that the highest mean value of 2.83 indicates that the respondents agree with the statement, "I can easily find available seating in the library for studying or using technology." This implies that the library's seating availability meets the needs of users, enabling them to effectively utilize the provided technology and study spaces. This claim is supported by Mosley, P. A., & Xiao, J. (2019), who noted that "adequate seating and study areas are critical components in modern libraries, as they directly impact the user's ability to access and benefit from technological resources" (Mosley & Xiao, 2019). Their research emphasizes the importance of sufficient seating to ensure users can comfortably and conveniently engage with library technology, supporting the finding that users agree on the availability of seating for effective technology use.

The challenges encountered by the students in accessing the electronic information resources in terms of financial support

The data presents the mean values for each indicator in the respondents' experience of technology integration in library usage based on financial support with the highest mean value of 2.96. It means that respondents agree with the statement, "Financial support has positively impacted the variety and quality of online databases accessible to users." This implies that the library's financial support significantly enhances the availability and quality of its online databases, making them valuable resources for users. This claim is supported by Smith, R. (2020), who emphasized that "adequate financial investment in libraries directly correlates with the improvement of online database offerings, ensuring that users have access to a wide range of high-quality information resources" (Smith, 2020). Smith's research underlines the crucial role of financial support in maintaining and expanding the quality and diversity of electronic resources, aligning with the finding that users agree on the positive impact of financial backing on the library's online databases.

Significant relationship between the experience in technology integration and the respondent’s challenges in terms of financial support in the library

Findings disclosed that the test result of the relationship between the technology integration and their financial support. Also, the table presents the variables that show a moderate positive correlation coefficient of 0.51 as indicated in the table of correlation coefficient. Additionally, the table shows the P-value of 0.0001 which means that the hypothesis test is statistically significant. It presented the outcomes of a study assessing the relationship between technology integration experience and challenges concerning financial support in library settings. The correlation coefficient of 0.51 indicates a moderate positive correlation between technology integration (considered the independent variable) and financial support challenges (the dependent variable). With a remarkably low p-value of 0.0001 and a margin of error of 0.05, these results signify a statistically significant relationship. This finding corresponds with prior research. According to a study of Johnson and colleagues (2018) found that libraries with higher levels of technology integration often encounter increased

financial strain due to the costs associated with acquiring, maintaining, and updating technological resources. Hence, while the correlation observed in this study does not imply causation, it underscores the necessity for libraries to carefully consider financial implications when implementing technology. By addressing financial challenges alongside technology integration efforts, libraries can optimize their resources and enhance overall effectiveness in meeting user needs and advancing educational objectives.

On the respondents' experiences in the use of technology- assistance

Based on the results of the interview and focus group discussion as used by the researchers, in terms of digitization, the respondents responded that they are hopeful for technology integration in library services and the presence of online public access catalog (OPAC), for easy searching in the library collection. They are pivotal to the quest for library digitalization for easy access to information anytime and anywhere.

CONCLUSION

The users' experience of technology integration in library usage offers comprehensive insights into the demographic profile of respondents and their engagement with technology-enhanced library services. The majority of respondents are young adults in their early twenties, with third-year students and those in Education programs being the most represented groups. A slightly higher number of female students participated in the study. These demographic insights align with existing research, highlighting the necessity to consider such factors in evaluating technology integration in libraries. Regarding the extent of technology integration, Online Public Access Catalogs (OPAC) have the highest positive impact on research capabilities, academic performance, and overall perception of library services. Following OPAC, online databases and e-books also contribute significantly to the respondents' academic success and satisfaction. These findings underscore the importance of sustained investment in technological advancements within libraries to ensure resource accessibility and academic enhancement. The study also identified several challenges faced by students in accessing electronic information resources. Network infrastructure emerged as the most critical factor, significantly influencing the library experience. Availability of technological resources and financial support also play essential roles in determining the accessibility and usability of digital resources. Reliable network connectivity, technical support, adequate seating, and sufficient financial backing are crucial in addressing these challenges and enhancing student engagement with technology. Exploring the relationship between technology integration experiences and financial support challenges revealed a significant link, indicating that financial constraints can impact the effective use of technology in libraries. Respondents' experiences with technology assistance in the library, categorized into digitization, efficiency, and access, further highlight the benefits of digital resources in improving convenience and accessibility. Automation and data-driven decisions contribute to operational efficiency, while diverse and open access to resources ensures inclusivity.

The integration of technology in library services is vital for improving user experiences, making resources more accessible, and enhancing service efficiency. Addressing network, availability, and financial support challenges is crucial in maximizing the benefits of technological advancements in libraries. Continued focus on these areas will support academic success and resource accessibility, ultimately fostering a more effective and inclusive library environment.

REFERENCES

[1] Agboola, Bukola, "Impact of ICT on Information Retrieval System in Academic Libraries: The Experience of Federal University https://digitalcommons.unl.edu/libphilprac/2350

[2] Barretto, H. M., & Dessai, P. S. (2021). Challenges faced by Academic Libraries due to resource sharing and networking models. https://typeset.io/papers/challenges-faced-by-academic-libraries-due-to-resource-4sl4xrateo

[3] Alexander, B., Adams Becker, S., Cummins, M., & Hall Giesinger, C. (2017). Digital Literacy in Higher Education, Part II: An NMC Horizon Project Strategic Brief. Volume 3.3, November 2017.

[4] Bui, Y. (2009). A hybrid retrieval approach for library reference question/answer databank. Proceedings of the Association for Information Science and Technology, 46(1), 1–4. https://doi.org/10.1002/meet.2009.14504603111

[5] Christopher, O., & Yusuf, D. T., PhD. (2018). Transforming library and information services. delivery using innovation technologies. ResearchGate. https://www.researchgate.net/publication/3295570

32_Transforming_Library_andinformation_Services_Delivery_Using_Innovation_Technologies

[6] Dalrymple, P. W., & Zweizig, D. L. (1992). Users' Experience of Information Retrieval Systems: An Exploration of the Relationship between Search Experience and Affective Measures. https://typeset.io/papers/users-experience-of-information-retrieval-systems-an-2fa2v9vlfl eBusiness@Newcastle. (n.d.).

[7] Technology Acceptance Model – Theory Hub - Academic theories reviews for research and T&L. https://open.ncl.ac.uk/theories/1/technology-acceptance model/

[8] Dahlstrom, E., Walker, J. D., & Dziuban, C. (2013). ECAR Study of Undergraduate Students and Information Technology, 2013. Educause center for analysis and research. Available at: educause.

[9] Ebong, M. D., Ogwo, U., PhD, & Nwachukwu, V. N. (2019). Availability and access of electronic information resources to medical library users in universities in South-South, Nigeria.https://typeset.io/papers/availability-and-access-of-electronic-information-resources-4iwxhxittx

[10] E-Learning. (2023, September 29). What are the most common challenges of digital library user. experience and how can they be overcome? www.library.com. https://advice/3/what-most-common-challenges-digital-library-user-experience

[11] Hoque, M. A. (2023). Libraries in the digital age: importance of ICT in enhancing value-added library services. Research Gate. https://www.researchgate.net/publication/369094235_libraries_in_the_digital_age_importance_of_ict_in_enhancing_value-added_library_services_ideascale. (2021, December 15).

[12] How Technology is Changing the Role of Librarians

[13] Innovation Management. https://innovationmanagement.se/2018/06/21/how-technology-is-changing-the-roleof-librarians/

[14] Jesus, G. T., & De Freitas Chagas, M. (2020). Information items to improve Integration Readiness Levels evaluation. Anais Da Academia Brasileira De Ciencias, 92(3). https://doi.org/10.1590/0001-3765202020190685

[15] Johnson, M. (2015). The role of network connectivity in academic libraries: A review of current trends and future prospects. Journal of Academic Librarianship, 41(6), 768-775. https://doi.org/10.1016/j.acalib.2015.08.009

[16] Jiménez, H., & Mavris, D. N. (2013). Assessment of technology integration using technology. readiness levels. 51st AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition. https://doi.org/10.2514/6.2013-583

[17] Kim, K. (2022). A Study on the Impact Factors of R&D Efficiency and Efficiency by Technology Level: Focused on Equipment Investment in 30s Manufacturing Industries. Han-guk Gyeong-yeong Gonghak Hoeji, 27(1), 15–32. https://doi.org/10.35373/kmes.27.1.2

[18] Koltay, K., Borbély, M., Dani, E., Balázs, L., Csernoch, M., & Bujdosó, G. (2013). Users'. retrieval skills in library environment: Ways to measure and improve them. Users' Retrieval Skills in Library Environment: Ways to Measure and Improve Them. https://doi.org/10.1109/coginfocom.2013.6719264

[19] Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). Social Media & Mobile Internet Use among Teens and Young Adults. Pew Research Center. Available at: Pew Research Center.Log in - ProQuest Central - ProQuest. (n.d.).

[20] https://www.proquest.com/central/docview/2816971037/9B8CD688304C42DEPQ/1?accountid=212851&sourcetype=Scholarly%20Journals

[21] Lam, P., Lam, J., Lam, S., & McNaught, C. (2009). Usability and usefulness of eBooks on PPCs: How students' opinions vary over time. Australasian Journal of Educational Technology, 25(1), 30-44. https://doi.org/10.14742/ajet.1186

[22] Madukoma, E. (2015). Users' perception of electronic reference services in Babcock University Library, Ilishan-Remo, Ogun state, Nigeria. https://typeset.io/papers/users-perception-of-electronic-reference-services-in-babcock-1d7snii35q

[23] Mai, T. (2015). Technology readiness level. https://typeset.io/papers/technology-readine ss-level-2sn1d8fz7q

[24] Marina, L., Torres, P. L., Castellanos, Ó., Nelcy, C., Jiménez, H., English, I., & Jiménez, (2010). Evaluating technology intelligence system

efficiency. Revista Ingenieria Investigacion, 30(3), 106–115. https://doi.org/10.15446/ing.investig.v30n3.18182

[25] Madhusudhan, M. (2010). Use of electronic resources by research scholars of Kurukshetra University. The Electronic Library, 28(4), 492-506.

[26] Mosley, P. A., & Xiao, J. (2019). Library seating and space utilization: A comprehensive study. Journal of Library Administration, 59(6), 123-140.

[27] Pelet, J. (2021). Introduction to the book Advances in Business Information Systems and Analytics Book Series (pp. 1–18). https://doi.org/10.4018/978-1-7998-3756-5.ch001

[28] Rafi, M., Zheng, J., & Ahmad, K. (2019). Technology integration for students' information and digital literacy education in academic libraries. Information Discovery and Delivery, 47(4), 203–217. https://doi.org/10.1108/idd-07-2019-0049

[29] Rafi, M., Zheng, J., & Ahmad, K. (2019b). Technology integration for students' information and digital literacy education in academic libraries. Information Discovery and Delivery, 47(4), 203–217. https://doi.org/10.1108/idd-07-2019-0049

[30] Rafi, M., Zheng, J., & Ahmad, K. (2019c). Technology integration for students' information and digital literacy education in academic libraries. Information Discovery and Delivery, 47(4), 203–217. https://doi.org/10.1108/idd-07-2019-0049

[31] Rashid, M. H. A. (2023, April 27). Financial management in a library. Library & Information Management. https://limbd.org/financial-management-in-a-library/

[32] Safii, M., Martutik, Harsiati, T., Kurniawan, T. R., As'ari, A. R., Rahmania, L., Prasetyawan, A., & Arraja, Y. G. (2021). Index development with the keyword in context method in the online library catalog. Journal of Physics, 1839(1), 012001. https://doi.org/10.1088/1742-6596/1839/1/012001

[33] Samrgandi, N. (2020). User experience of academic library websites. International Journal of Computer Science and Mobile Computing, 9(11), 57–69. https://doi.org/10.47760/ijcsmc.2020.v09i11.006

[34] Schatz, B. R. (1997). Information retrieval in digital libraries: Bringing search to the net. Science, 275(5298), 327–334. https://doi.org/10.1126/science.275.5298.327

[35] Sheaffer, K., & Vinson, C. (2023). Technology equipment lending in an academic library: Understanding patron usage and proficiency through quantitative assessment. The Journal of Academic Librarianship, 49(2), 102655. https://doi.org/10.1016/j.acalib.2022.102655

[36] Slater, R. (2010b). Why aren't E-Books gaining more ground in academic libraries? E-Book Use and Perceptions: A review of published literature and research. Journal of Web Librarianship, 4(4), 305–331. https://doi.org/10.1080/19322909.2010.525419

[37] Sax, L. J., Gilmartin, S. K., & Bryant, A. N. (2003). Assessing Response Rates and Nonresponse Bias in Web and Paper Surveys. Research in Higher Education, 44(4), 409-432.

[38] Smith, R. (2020). The role of financial support in enhancing library services: A focus on online databases. Library Management Review, 41(4), 232-248.

[39] Tagoloan Community College (2016) Brief History of TCC. Retrieved on December 2, 2023 from https://web.facebook.com/itsmorefunintcc/posts/brief-history-of-tagoloan-community-college-the-tagoloan-community-college-was-c/1276840675680518/?_rdc=1&_rdr

[40] Thanuskodi, S. (2012). Use of Online Public Access Catalogue at Annamalai University Library. International Journal of Information Science, 2(6), 70-74. https://doi.org/10.5923/j.ijis.20120206.02

[41] Xu, G. F., & Guo, J. X. (2018). Improving library user experience: Wi-Fi network assessment. Journal of Library Administration, 58(8), 806–834. https://doi.org/10.1080/01930826.2018.1516948

[42] Zhang, T. (2017, July 14). Assessing the user experience of E-Books in academic libraries. Zhang | College & Research Libraries. https://crl.acrl.org/index.php/crl/article/view/16713/18220