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Innovative Library Informatics for NEUST Off-Campus

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Abstract. This study addresses the challenges encountered by academic libraries, particularly those at the off-campuses of the Nueva Ecija University of Science and Technology (NEUST), which face issues such as manual processes, limited security, and fragmented resource access. The primary objective was to design, develop, and evaluate an information technology solution—the Innovative Library Informatics—to modernize and streamline library operations at the NEUST General Tinio (Papaya) Off-Campus. Employing a convergent-parallel research design, quantitative and qualitative data were integrated to provide a comprehensive analysis. Data collection was facilitated through purposive sampling, focusing on IT experts and end-users such as librarians, library staff, students, and faculty. Agile development methodology was employed, ensuring iterative improvements. Findings highlight the system's technical viability and user acceptability, offering valuable insights for library innovation. This research contributes to enhancing academic libraries' operational efficiency and user satisfaction.

Keywords: Library Informatics; Agile Methodology; ISO/IEC 25010; Library Systems; NEUST

1. Introduction

Academic libraries are transitioning from traditional repositories to dynamic centers for information and innovation (Limwichitr, 2024; Khalil et al., 2024) However, libraries at the NEUST off-campuses continue to face challenges such as manual operations and insufficient security. These limitations hinder the delivery of efficient library services. This study introduces the Innovative Library Informatics system, which integrates advanced technologies, including facial recognition and QR codes, to address these challenges. The objective is to enhance library operations, align with 21st-century learning environments, and contribute to the NEUST community's academic success.

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The library serves as a vital resource for student faculty, and staff, provides access to various educational materials and research tools (Freeman et al., 2025; Sahin et al., 2024) . However, the library of NEUST Papaya Off-Campus relies heavily on manual process for managing its daily operations, such as book borrowing, returning, cataloguing, and record keeping. This system often leads to inefficiencies, delays, and human errors compromising the quality services offered to users.

Additionally, the library setup lacks robust security features making it challenging to safeguard valuable resources such as books, electronic devices and confidential users' records. The absence of an automated tracking system increases the risk of unreturned books, loss of resources and an authorized access to sensitive information.

In an era of digital transformation, the reliance on manual methods creates a significant gap in the library's ability to provide efficient and secure devices there is a pressing need to modernize the library management system to ensure smooth operations, enhanced security, and better most the needs of its user.

To meet this need, the researcher introduced an Innovative Library Informatics for the NEUST Off-Campus Program - General Tinio (Papaya). This innovative project aims to transform how educators and students use library resources by addressing the limitations of conventional systems and leveraging cutting-edge technologies such as facial recognition, Quick Response (QR) code creation, artificial intelligence, and data analytics. Through these features, the system seeks to enhance security, streamline workflows, and provide an unparalleled user experience, ultimately maximizing efficiency and accessibility while enriching the educational journey of the NEUST community.

2. Methodology

This study employed a mixed-method research design, which combines both qualitative and quantitative research approaches to offer a more comprehensive and nuanced understanding of the research problem (Zou & Xu, 2023). The integration of these two methods allows for the triangulation of data, enabling the researcher to explore the research questions from multiple perspectives and enhance the validity and reliability of the findings (Dalei, 2023).

Specifically, a convergent-parallel mixed-method design was adopted. In this design, qualitative and quantitative data were collected simultaneously but

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analyzed separately. Once the data analysis was complete, the results from both methods from the evaluation of the Innovative Library Informatics were compared and synthesized to draw overall conclusions. The use of this design allowed the researcher to capture the strengths of both qualitative and quantitative approaches: qualitative methods provide in-depth insights into individual experiences, perceptions, and motivations, while quantitative methods enable the measurement of trends, patterns, and correlations within a larger sample (Adhikari & Timsina, 2024).

2.1 Sampling Procedure

This study employed a purposive sampling technique to identify the respondents who would be involved in assessing the technical aspects and overall quality of the Innovative Library Informatics. Purposive sampling, also known as judgmental or selective sampling, is a non-probability sampling method in which the researcher deliberately selects participants based on specific characteristics or criteria relevant to the study's objectives. In this context, the respondents were chosen for their expertise, direct involvement, or experience with library services, technology, and the implementation of the system (Andrade, 2020). A purposive sampling technique was employed, involving 332 respondents, including IT experts, librarians, and students.

2.2 Research Site

The locale of this study is situated within the NEUST General Tinio (Papaya) Off-Campus, specifically within the premises of the campus library, which serves as the central setting for the development and implementation of the Innovative Library Informatics. The NEUST Papaya Off-Campus Library plays a vital role in the academic ecosystem of the university, acting as a centralized hub for students, faculty, and staff to access a wide array of academic resources. These include books, journals, multimedia materials, and other research tools essential to the academic success of the university community.

2.3 Respondents

The respondents of this study consisted of key stakeholders within the NEUST General Tinio (Papaya) campus community, each playing an essential role in shaping the development and evaluation of the Innovative Library Informatics system. Table 1 below shows the distribution of the respondents.

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Table 1

Distribution of Respondents

Respondents	Frequency	Percentage
IT Experts	**11**	**3.31%**
End-Users		
Librarian	**5**	1.51%
Library Staff	**15**	4.52%
Faculty	**30**	9.04%
Students	**271**	81.63%
Total	**332**	**100%**

As shown in the above table, the respondents of this study included key stakeholders from NEUST General Tinio (Papaya) campus. Library personnel provided insights into operational needs and challenges, ensuring the system aligned with daily functions. Students from the NEUST Papaya Off-Campus Program offered feedback on usability, accessibility, and functionality, ensuring the system met diverse user needs. An IT expert contributed technical expertise, ensuring the system was robust, scalable, and effectively integrated. These stakeholders collaboratively shaped a user-friendly and efficient library informatics system.

3. Results and Discussion

This section presents the analysed findings of the study, focusing on the design, development, and evaluation of the Innovative Library Informatics system. The discussion highlights the implications of the results and situates them within the context of existing literature and relevant standards, specifically ISO/IEC 25010.

The Innovative Library Informatics system was evaluated based on eight criteria from the ISO/IEC 25010 standard. The findings, summarized in Table 2, indicate high performance across all categories, with the overall rating of 3.45.

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Table 2: *Key Findings from the Evaluation*

Criteria	Mean	Verbal Description
Functional Suitability	3.43	Highly Functional
Performance Efficiency	3.39	Highly Efficient
Compatibility	3.37	Highly Compatible
Usability	3.44	Highly Usable
Portability	3.49	Highly Portable
Security	3.55	Highly Secured
Reliability	3.41	Highly Reliable
Maintainability	3.55	Highly Maintainable

The evaluation presented in the above table highlights the system's performance across various quality criteria, with scores reflecting "Highly" satisfactory performance in all aspects. Notably, Security and Maintainability achieved the highest mean scores of 3.55 each, demonstrating robust protection against data breaches and ease of updates, patches, and enhancements. These results align with best practices in data privacy and system adaptability, as emphasized by Wang et al. (2024) and Dharmayanti et al. (2023). Similarly, portability received a high score of 3.49, indicating the system's strong ability to operate effectively across diverse environments, thereby enhancing accessibility and scalability (Bibri, 2018).

Usability was rated 3.44, reflecting the system's intuitive design and positive user experiences, consistent with usability principles outlined by Nielsen (2005), as cited by Behroozfar, H. (2023). Meanwhile, functional suitability and performance efficiency received slightly lower scores of 3.43 and 3.39, respectively. These scores suggest that while the system effectively covers its intended tasks and operates efficiently, there is room for improvement in areas such as task comprehensiveness and resource optimization (Walia et al., 2023). Compatibility and reliability were rated 3.37 and 3.41, respectively, indicating that the system performs well in terms of interoperability and dependable operation but could benefit from further enhancements to achieve greater robustness and seamless integration (Mallo et al., 2024).

Overall, the findings reveal strong system performance across all evaluated criteria, with security and maintainability emerging as standout strengths. While

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the system demonstrates high usability, portability, and reliability, areas such as functional coverage and efficiency offer opportunities for targeted refinements. These results underscore the importance of continuous evaluation and enhancement to meet evolving operational demands and user expectations (ISO/IEC 25010, 2011).

End-User Feedback

End-users evaluated the system as highly functional, efficient, and compatible, with an overall rating of "Excellent" (Grand Weighted Mean = 3.27). Accessibility (3.35) emerged as a strength, underscoring the system's inclusivity, while User Error Protection (3.16) was identified as an area for improvement. For the observations the users praised the intuitive interface and ease of operation. Suggestions included enhancing error prevention mechanisms to minimize user mistakes and improve usability further.

The evaluation results underscore the effectiveness of the Innovative Library Informatics system in meeting the diverse needs of its stakeholders. High ratings across criteria such as Security, Maintainability, and Portability demonstrate its alignment with international standards and its suitability for deployment in educational institutions.

Security. The system's strong focus on confidentiality, integrity, and non-repudiation aligns with best practices in data protection, as highlighted by Persadha et al. (2024). These features instill trust among users and administrators.

Usability. High ratings for Learnability and Accessibility reflect the system's commitment to inclusivity, supporting diverse user groups, including those with limited technical expertise.

Maintainability. The modular design ensures ease of updates and compatibility with evolving user needs, consistent with recommendations by Daute and Conrad (2010).

Comparison with Existing Literature

The system's high scores for performance efficiency and reliability are comparable to findings in recent studies on intelligent library systems (e.g., Elias & Lubua, 2021). However, areas such as error prevention and response time require further refinement to align with top-performing systems globally.

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Implications for Practice

Enhanced Library Operations: By streamlining processes such as attendance monitoring and inventory management, the system reduces administrative workload and improves efficiency.

Scalability. The high portability and compatibility ratings indicate potential for adoption in diverse institutional settings, ensuring long-term sustainability.

Future Enhancements. Focus areas include optimizing error prevention mechanisms and enhancing response times to cater to peak usage scenarios.

For the limitations and future research, while the system demonstrates robust performance, the study was limited to a single institution. Future research should explore system scalability across multiple campuses, incorporate user feedback to address usability gaps, particularly in error protection. Investigate the impact of emerging technologies (e.g., AI, IoT) on system functionality.

4. Conclusions

Based on the summary of findings, the following conclusions were drawn for this study:

1. The Innovative Library Informatics proved to be highly effective. Ultimately, the use of the Agile Process Model facilitated the creation of a system that aligns with the objectives and requirements of the project, ensuring a robust and functional solution.
2. The Innovative Library Informatics successfully passed the ISO/IEC 25010 software quality criteria evaluation. This assessment confirmed that the system was both technically sound and ready for implementation and deployment.
3. The evaluation of the Innovative Library Informatics system by a diverse group of end-users, including librarians, library staff, faculty, and students, provided valuable insights into its functionality and usability. The system generally met the expectations of its intended users.
4. The assessment of the system's acceptance level provided valuable insight into the end-users' openness to adopting and utilizing the Innovative Library Informatics system once deployed at the NEUST General Tinio (Papaya) Off-Campus. This evaluation not only highlighted the overall

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readiness of the end-users but also identified potential concerns or reservations that may affect the system's successful implementation.

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REFERENCES

Adhikari, R., & Timsina, T. P. (2024). An educational study focused on the application of mixed method approach as a research method. OCEM Journal of Management Technology & Social Sciences, 3(1), 94-109, https://doi.org/10.3126/ocemjmts s.v3i1.62229.

Andrade, C. (2020). The inconvenient truth about convenience and purposive samples. Indian Journal of Psychological Medicine, 43(1), 86-88, https://doi.org/10.1177/0253717620977000.

Behroozfar, H. (2023). Usability evaluation of journal websites in the field of knowledge and information science based on the Nielsen model. *Library and Information Science Research*, *13*(1), 44-61, https://doi.org/10.22067/infosci.2023.79151.1141.

Bibri, S. E. (2018). The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability. *Sustainable cities and society*, *38*, 230-253, https://doi.org/10.1016/j.scs.2017.12.034.

Cerin, Marcelino S. III (2024). Church Donation Management System with Data Analytics. Unpublished MSIT Thesis. Nueva Ecija University of Science and Technology – Graduate School.

Dalei, S. R. (2023). Mixed method research. In Futuristic Trends in Pharmacy & Nursing Volume 2 Book 23 (pp. 155-162). Iterative International Publishers, Selfypage Developers Pvt Ltd., https://doi.org/10.58532/v2bs23p1ch12.

Daute, O., & Conrad, S. (2010). Supporting complex business information systems. In Lecture notes in business information processing (pp. 171-182), https://doi.org/10.1007/978-3-642-12814-1_15.

Dharmayanti, N., Ismail, T., Hanifah, I. A., & Taqi, M. (2023). Exploring sustainability management control system and eco-innovation matter sustainable financial performance: The role of supply chain management and digital adaptability in indonesian context. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(3), 100119, https://doi.org/10.1016/j.joitmc.2023.100119.

Elias, J. D., & Lubua, E. W. (2021). The impact of usability, functionality and reliability on users' satisfaction during library system adoption. The Journal of Informatics, 1(1), https://doi.org/10.59645/tji.v1i1.13.

Esteban, A. P., Piad, K., Tano, I., Espino, J., Lagman, A., Victoriano, J., & Mababa, J. (2024, September). Implementation of Digital Governance in the Philippine SUCs: Basis for an Enterprise-Level Information System Model. In 2024 6th International Workshop on Artificial Intelligence and Education (WAIE) (pp. 374-378). IEEE.

Freeman, J. M., & Nagel, G. (2025). Curricular support, equipment lending, and a defense of evolving classic library services. *The Journal of Academic Librarianship*, *51*(1), 102985, https://doi.org/10.1016/j.acalib.2024.102985.

Khalil, O., Khalil, H., & Khalil, N. (2024). Academic libraries' knowledge sharing and service innovation: The mediating role of management and IT innovations. *The Journal of Academic Librarianship*, *50*(1), 102832, https://doi.org/10.1016/j.acalib.2023.102832

International Organization for Standardization (2011). ISO/IEC25010: System and software engineering – Systems and software Quality Requirement and Evaluation (SQuaRE). https://www.iso.org/standard/78176.html.

Limwichitr, S. (2024). Academic Library 4.0 and Beyond: Investigating Adaptation of Academic Libraries in Thailand Towards a 4.0 Landscape. *The Journal of Academic Librarianship*, *50*(2), 102857, https://doi.org/10.1016/j.acalib.2024.102857.

Mallo, S. F., Abdulqader, D. M., Abdullah, R. M., Ismael, H. R., Rashid, Z. N., & Sami, T. M. G. (2024). A Review on Feasibility of Web Technology and Cloud Computing for Sustainable ES: Leveraging AI, IoT, and Security for Green Operations. *Journal of Information Technology and Informatics*, *3*(2).

Nielsen, J. (2005). Characteristics of the usability problems found by heuristic evaluation. nngroup. https://www.nngroup.com/articles/usability-problems-found-by-heuristicevaluation/.

Persadha, P. D., Judijanto, L., Susanti, M., & Reza, H. K. (2024). Data Privacy and Security Protection Strategies in Library Electronic Resources Management. Holistik Analisis Nexus, 1(7), 115-122, https://doi.org/10.62504/nexus742.

Sahin, A., Imamoglu, G., Murat, M., & Ayyildiz, E. (2024). A holistic decision-making approach to assessing service quality in higher education institutions. *Socio-Economic Planning Sciences*, *92*, 101812, https://doi.org/10.1016/j.seps.2024.101812.

Walia, G. K., Kumar, M., & Gill, S. S. (2023). AI-empowered fog/edge resource management for IoT applications: A comprehensive review, research challenges and future perspectives. *IEEE Communications Surveys & Tutorials*, https://doi.org/10.1109/COMST.2023.3338015.

Wang, S., Asif, M., Shahzad, M. F., & Ashfaq, M. (2024). Data privacy and cybersecurity challenges in the digital transformation of the banking sector. *Computers & security*, *147*, 104051, https://doi.org/10.1016/j.cose.2024.104051.

Zuo, P.X.W. & Xu, X. (2023). Mixed Methods Research. In Research Methodology and Strategy (pp. 85-96). Wiley. https://doi.org/10.1002/9781394190256.ch4.