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Library Systems Development: Utilization, Usability and Impact for Private Schools in Negros Occidental, Philippines

Stephanie L. Lampaza¹; Mary Joy P. Parrenas²; Angele D. Suarez³;
Kristine T. Soberano, Ph. D.⁴

¹College of Computer Studies, University of Antique, Philippines

²Department of Computer Studies, Colegio de Sta. Ana de Victorias, Philippines

³Department of Computer Studies, Colegio de Sta. Ana de Victorias, Philippines

⁴MIT Department, State University of Northern Negros, Philippines

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Abstract: This study delves into the development, utilization, and evaluation of a Library Management System (LMS) in private schools within Negros Occidental, Philippines. Recognizing the inefficiencies of traditional manual library systems, a web-based LMS was designed and deployed at Colegio de Sta. Ana de Victorias (CSAV). The system was developed to automate library tasks, optimize information retrieval, and improve overall library operation. The research thoroughly assessed the system's usability through users testing and feedback, and evaluated its impact on library operations, users' satisfaction, and academic performance. By gathering both quantitative and qualitative data, this study provides a clear understanding of the practical application of LMS in a real-world educational setting. Findings indicate that the LMS significantly improved library functions, reduced processing time, and enhanced accuracy. Librarians reported increased efficiency and more time for user interaction. Students and faculty derive benefit from improved access to library resources and instantaneous retrieval of information. Despite this, implementation challenges to a new method such as resistance to change, technical issues, and inadequate training were identified. The study concludes that the development and implementation of the LMS at CSAV demonstrates the potential of library automation to enhance library services in private schools. This research contributes to the growing body of knowledge on library systems development and provides valuable recommendations for future implementations and improvements.

Keywords: Library Management System, Library Automation, Technology in Libraries, Private Schools, Negros Occidental, Philippines

I. Introduction

Libraries play a crucial role in quality education by serving as vital resources that grant access to knowledge, facilitate research, encourage literacy, create a favourable learning atmosphere, and advocate for continuous learning among both students and educators. As mentioned by Ashiq (2021), academic libraries are currently grappling with a range of persistent challenges, encompassing technological disruptions, leadership issues, educational transformation, digitization efforts, changes in scholarly communication, adapting to the needs of contemporary learners, and financial constraints. However, traditional library operations, commonly employing manual techniques, have faced challenges in terms of efficiency, accuracy, and accessibility. In developing countries like the Philippines, these problems are particularly acute. This limits the opportunities for students to interact with each other in the library spaces (McCunn & Gifford, 2015).

The dawn of the technological age has ushered in a new era for libraries, with Library Management Systems (LMS) emerging as a powerful tool for transforming library operations. These systems have the capability to mechanize or computerize routine tasks, improve information retrieval, and enhance overall library services. Computer designers dating back to the 1950s believed in applying an LMS for educational purposes as conceivable and necessary (Watson & Watson, 2012). There were different strategies for using an LMS as an educational resource with multiple vocabulary words that relate to computer use according to (Kehrwald & Parker, 2019). Through time, the technology and tools which support online learning structures were progressing since the advent of online learning in the mid to late 1990s (Kehrwald & Parker, 2019).

This study aims to contribute to the growing body of knowledge on library automation in the Philippines by developing and assessing an LMS specifically tailored to the needs of private schools in Negros Occidental. The research investigates the following objectives:

1. **Development of a Functional LMS:** To design and implement a web-based LMS that addresses the specific requirements of private schools in the region.
2. **Usability Evaluation:** To assess the system's user-friendliness and effectiveness in supporting library tasks.
3. **Impact Assessment:** To evaluate the LMS's influence on library operations, user satisfaction, and academic performance.

By addressing these objectives, this research contributes to the advancement of library automation in the Philippines and provides valuable insights for policymakers, educators, and library practitioners.

II. Methodology

Research Design: This study employs a mixed-methods approach, combining quantitative and qualitative research methods.

LMS Development: The LMS was developed using the Agile methodology, with phases including planning, design, development, testing, and implementation. PHP and MySQL were the primary development tools.

Agile Method

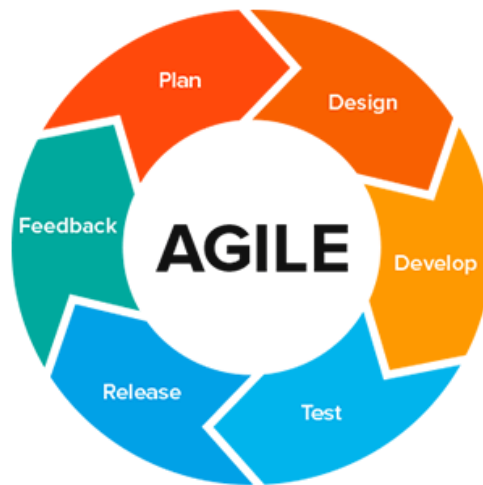


Figure 1 Agile Method processes used by the Proponents

Planning Phase:

Initially, the researcher first identifies the scope of the problem and determines solutions in the library of CSAV and decides what system to be developed, what languages would be used and how the system should be implemented.

Designing Phase:

The designing phase is where the researchers decide on the design of the system which includes the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system.

Developing Phase:

The developing phase is where the researchers start to develop the system through hard coding using PHP and MySQL.

Testing Phase:

The testing of the system conducted by the researchers using Alpha Test, administered to fifteen students of Colegio de Sta. Ana de Victorias to determine and meet the objectives of the study.

Implementation Plan:

The researchers conducted an Alpha Testing which is a type of acceptance testing performed to identify all possible issues or bugs before releasing the product.

Feedback:

Comments, suggestions and recommendations were recognized and given primary focus by the proponents for later improvement of the system.

Respondents of the Study:

The respondents of the study are the students, faculty and staff of Colegio de Sta. Ana de Victorias in Negros Occidental.

Respondents	Sample
Students	40
Faculty	15
Staff	4
Total	59

To streamline the participant selection process, the researcher opted for a convenience sample, focusing on the students, faculty and staff of CSAV.

Data Collection:

Quantitative data were collected through questionnaires administered to librarians, teachers, and students. Qualitative data were gathered through interviews and observations.

Data Analysis:

Quantitative data were analyzed using descriptive statistics and inferential statistics. Qualitative data were analyzed through thematic analysis.

III. Results

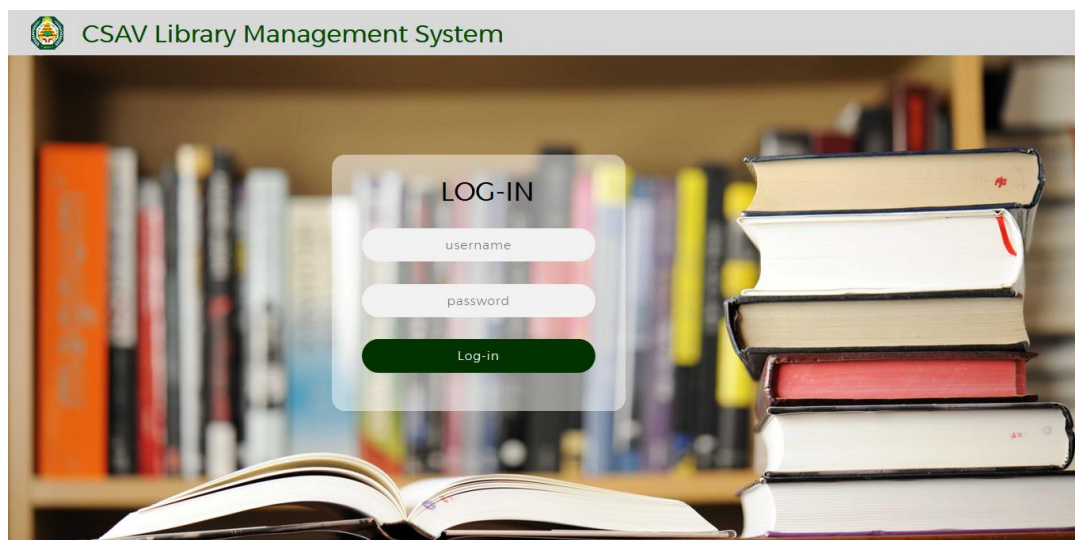


Figure 2 Log-in Form - Users can log-in through the log-in portal provided with their correct username and password.

Colegio de Sta. Ana de Victorias					
Search Book : Search					
Classification No.	Book Title	Author	Category	Publication Date	Availability
658.4033	Quantitative Methods for Business	David Anderson	Filipiniana	2017	Available
658.5	The Ultimate Encyclopedia of Corvette	Peter Hershow	General References	1963	Available
113	Merriam Webster Dictionary	Webster	General References	1992	Available
614.03	Occupational Forensic	Ashok Kumar	General References	2010	Available
658.4013	Total Quantity Management	James Evans	Filipiniana	2014	Available
303.34	Leadership	Richard Hugnes	Circulation	2006	Not Available
658.827	Rebuilding Brand America	Ditch Martin	Circulation	2007	Available
570	Biological Science	David Bueno	Filipiniana	2011	Available
9192	August Celebration	Linda Grover	Fiction	1993	Available
12345	Dictionary	Michael Fernandez	General References	2003	Available

Figure 3 Student Portal - The students can search the books they want to borrow and will be able to know the availability of the book.



Colegio de Sta. Ana de Victorias

LOG OUT

Dashboard

Circulations

Books

Borrowers

Users

Profile

DASHBOARD

Books Borrowed

← 3

Books Returned

→ 6

Books Archived

→ 2

All Books

 12

Students

 4

Faculty

 1

Users

 3

General References

 4

Circulation

 2

Filipiniana

 3

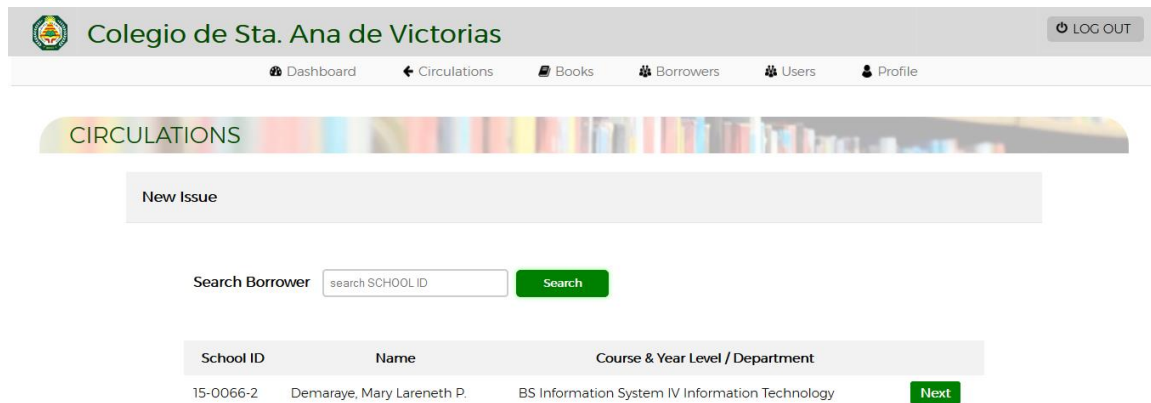
Fiction

 3

Figure 4 Dashboard - The user can easily check and monitor through the dashboards that are linked to their respective pages.

Colegio de Sta. Ana de Victorias					
Dashboard Circulations Books Borrowers Users Profile					
CIRCULATIONS					
Issue Book	Issue Bulk	Borrowed Books	Borrowed BULK Books	Returned Books	
School ID	Name	ISBN	Book Title	Status	
15-4444-2	Herbert L Ferrer	113	Merriam Webster Dictionary	Returned	
15-1111-2	Rico Tio	658.4033	Quantitative Methods for Business	Borrowed	
15-0066-2	Mary Lareneth P Demaraye	C9563	Yours Forever	Borrowed	
15-4444-2	Herbert L Ferrer	113	Merriam Webster Dictionary	Returned	
15-1111-2	Rico Tio	658.827	Rebuilding Brand America	Returned	
15-5555-2	Lailanie L Navarro	303.34	Leadership	Returned	
15-1111-2	Rico Tio	614.03	Occupational Forensic	Borrowed	
15-2222-2	Mary Joy P Parenas	658.4013	Total Quantity Management	Returned	
15-0066-2	Mary Lareneth P Demaraye	658.4033	Quantitative Methods for Business	Returned	

Figure 5 Circulations - Lists of all the issued books given with a status of whether they are returned or not.



Colegio de Sta. Ana de Victorias LOG OUT

Dashboard Circulations Books Borrowers Users Profile

CIRCULATIONS

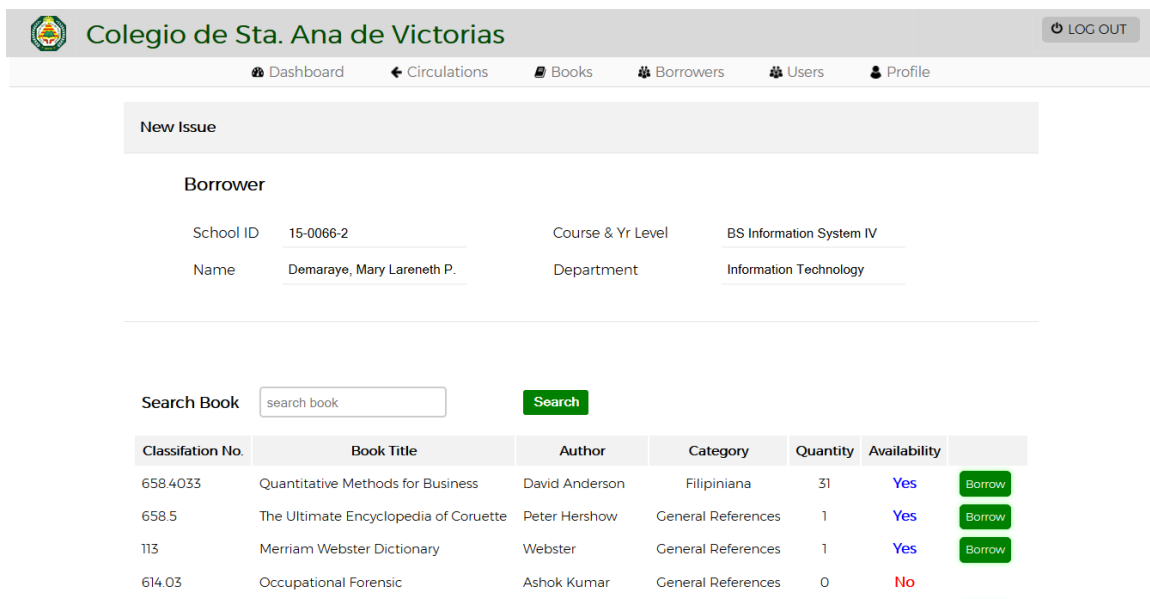
New Issue

Search Borrower

School ID	Name	Course & Year Level / Department
15-0066-2	Demaraye, Mary Lareneth P.	BS Information System IV Information Technology

Figure 6 Issuing a book 1

First step on borrowing a book where user can search for the school ID of the student or a faculty with a link beside the results, and when clicked, if the borrower has a pending book to be returned, he isn't allowed to borrow another book, on the other hand, he can continue to the next step of borrowing a book.



Colegio de Sta. Ana de Victorias LOG OUT

Dashboard Circulations Books Borrowers Users Profile

New Issue

Borrower

School ID Course & Yr Level

Name Department

Search Book

Classification No.	Book Title	Author	Category	Quantity	Availability
658.4033	Quantitative Methods for Business	David Anderson	Filipiniana	31	Yes
658.5	The Ultimate Encyclopedia of Coruette	Peter Hershaw	General References	1	Yes
113	Merriam Webster Dictionary	Webster	General References	1	Yes
614.03	Occupational Forensic	Ashok Kumar	General References	0	No

Figure 7 Issuing a book 2

Second step on borrowing a book where the user can search for the keyword of the book that the borrower wanted to borrow. Results were provided with quantities remaining and its availability.

COLEGIO DE STA. ANA DE VICTORIAS LOG OUT

Dashboard Circulations Books Borrowers Users Profile

CIRCULATIONS

New Issue

Date Borrowed: 04/28/19 Due Date: 4/29/19

BORROWER	School ID	15-0066-2
	Name	Mary Lareneth P Demaraye
BOOK	DDC	658.4033
	Book Title	Quantitative Methods for Business

BORROW

Figure 8 Issuing a book 3

Last step on borrowing a book where the user can set for the due date of the book to be borrowed. Dates that will be set after the date today will be indicated as invalid.

COLEGIO DE STA. ANA DE VICTORIAS LOG OUT

Dashboard Circulations Books Borrowers Users Profile

CIRCULATIONS

Issue Book Issue BULK View Circulations Borrowed Books Returned Books

Bulk Borrowed Books

School ID	Name	ISBN	Book Title	No of books borrowed	Date Borrowed	Due Date	Fine	Action
15-1111-2	Rico Tio	12345	Dictionary	30	2019-04-29	2019-04-29	0	Return

Figure 9 Bulk Borrowed Books List of borrowed books in bulk with the number of books borrowed and fine.

COLEGIO DE STA. ANA DE VICTORIAS LOG OUT

Dashboard Circulations Books Borrowers Users Profile

CIRCULATIONS

Issue Book Issue BULK View Circulations Borrowed Books Borrowed BULK Books

From: mm / dd / yyyy To: mm / dd / yyyy [Print Report](#)

Returned Books

School ID	Name	ISBN	Book Title	Date Borrowed	Due Date	Date Returned
15-1111-2	Rico Tio	658 4033	Quantitative Methods for Business	2019-04-29	2010-01-19	2019-04-29
15-1111-2	Rico Tio	658 4033	Quantitative Methods for Business	2019-04-27	2019-04-28	2019-04-29
15-0066-2	Mary Lareneth P Demaraye	G9563	Yours Forever	2019-04-27	2019-04-29	2019-04-29
15-1111-2	Rico Tio	614 03	Occupational Forensic	2019-04-27	2019-04-29	2019-04-29
15-0066-2	Mary Lareneth P Demaraye	658 4033	Quantitative Methods for Business	2019-04-27	2019-04-28	2019-04-29
15-4444-2	Herbert L Ferrer	113	Merriam Webster Dictionary	2019-04-27	2019-04-28	2019-04-27
15-4444-2	Herbert L Ferrer	113	Merriam Webster Dictionary	2019-04-27	2019-04-30	2019-04-27
15-1111-2	Rico Tio	658 827	Rebuilding Brand America	2019-04-27	2019-04-29	2019-04-27
15-3333-2	Lailanie L Navarro	303 34	Leadership	2019-04-27	2019-04-28	2019-04-27
15-2222-2	Mary Joy P Parrenas	658 4013	Total Quantity Management	2019-04-27	2019-04-28	2019-04-27

Figure 10 Returned Books List of books returned with the borrower and the book's details, together with the date borrowed, its due date and the date returned.

Acceptability of the system using the ISO/IEC 25010 Software Characteristics

Criteria	Grand Mean	Verbal Interpretation
Functional Suitability	4.47	Excellent
Performance Efficiency	4.53	Excellent
Compatibility	4.46	Excellent
Usability	4.50	Excellent
Reliability	4.54	Excellent
Security	4.60	Excellent
Maintainability	4.70	Excellent
Portability	4.30	Excellent
Grand Mean	4.51	Excellent

The table evaluates the software's quality based on the ISO/IEC 25010 standards, which define key attributes of software product quality. Each criterion—Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability—achieved a "Grand Mean" rating between 4.30 and 4.70, indicating consistent excellence across all aspects. The highest-rated attribute, Maintainability (4.70), highlights the ease with which the software can be modified or updated to adapt to changes. Security, another critical aspect, scored 4.60, reflecting strong measures to protect the system and its data. Reliability (4.54) and Performance Efficiency (4.53) signify robust operations and optimal resource usage. Functional Suitability (4.47) and Compatibility (4.46) demonstrate the software's ability to perform required tasks and integrate seamlessly with other systems. Usability (4.50) emphasizes user-friendliness, while Portability (4.30), though the lowest, still achieved an "Excellent" rating, showing the software's ability to operate across various environments. With an overall "Grand Mean" of 4.51, the software exhibits outstanding quality and aligns well with the ISO/IEC 25010 standards.

IV. Discussions

The developed Library Management System (LMS), evaluated using ISO/IEC 25010 standards, demonstrated exceptional quality across various dimensions, achieving an overall "Excellent" rating with a Grand Mean of 4.51. The system excelled in Maintainability (4.70), Security (4.60), and Reliability (4.54), showcasing its adaptability, robust data protection, and operational stability. High usability (4.50), validated through user testing, facilitated the automation of core library functions, resulting in reduced processing times, improved accuracy, and increased efficiency. Librarians gained more time for user interactions, while students and teachers benefited from better access to resources and faster information retrieval.

However, challenges such as resistance to change, technical issues, and inadequate training were noted during implementation, emphasizing the need for better change management and training

strategies. Future research should explore the LMS's long-term impact on academic performance and the integration of mobile technologies to enhance accessibility. Overall, the LMS exceeds quality expectations, significantly improving library operations and user experiences.

V. Conclusion

The development and implementation of the LMS at CSAV demonstrate the potential of library automation to enhance library services in private schools within Negros Occidental. The system has shown positive impacts on library operations, user satisfaction, and information access. Addressing implementation challenges and conducting further research on the long-term effects are essential for maximizing the benefits of LMS.

VI. Recommendations

Based on the findings of this study, the following recommendations are proposed:

- Expand the LMS to include additional features such as digital library, mobile app, and interlibrary loan.
- Provide comprehensive training for library staff on LMS utilization.
- Conduct regular system evaluation and updates.
- Encourage collaborative efforts among private schools in Negros Occidental to share best practices and resources.

By implementing these recommendations, schools can further optimize the use of their LMS and achieve greater benefits for their library users.

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