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Optimizing User Interface and User Experience: Exploring Design Improvements for the School Library System

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ABSTRACT

This study explores the impact of modern User Interface (UI) and User Experience (UX) principles on the effectiveness of a school library system. With advancements in Human-Computer Interaction (HCI) and an increasing emphasis on user-centered design, the current library system, which faces usability challenges and outdated design practices, has become a barrier to user satisfaction and engagement. The research aims to identify specific usability issues and apply UI/UX best practices to enhance the system's functionality, ease of use, and overall user experience. Through usability testing and user feedback, the study evaluates design flaws such as inefficient navigation, poor color schemes, and cumbersome data entry processes, and investigates how their resolution can improve system performance. Findings reveal that incorporating intuitive navigation, clearer labeling, and modern visual elements, such as optimized button sizes and improved color contrast, significantly enhance task completion efficiency and user satisfaction. Despite some lingering response time issues, the research highlights the critical role of UI/UX design in creating more accessible, engaging, and efficient digital platforms, contributing to improved user experiences and overall system effectiveness in library management.

Keywords: Library Management, Navigation Efficiency, User Interface, User Experience, Usability Testing.

1.0 INTRODUCTION

1.1 Background and Context

With the rapid advancement of Human-Computer Interaction (HCI), the role of user-centered design has expanded beyond just functionality, encompassing usability, satisfaction, and engagement. HCI emphasizes creating intuitive and user-friendly digital systems, which has become essential in various fields, including education. The Library System of the school plays a critical role in supporting the academic community by facilitating access to learning materials and resources. However, with technological advancements and the growing importance of user-centric digital platforms, the current library system faces challenges in user engagement and satisfaction due to outdated design practices and usability issues.

In a time when user interface (UI) and user experience (UX) design have become fundamental in ensuring effective interaction with digital systems, the library's platform must adapt to meet these expectations. A well-designed UI/UX not only enhances the system's functionality but also ensures ease of use, engagement, and satisfaction among its users (Sanjaya, 2023). This study aims to explore how modern UI/UX principles can address the library system’s design shortcomings.

This case study focuses on identifying specific usability issues and design flaws that hinder the user experience. Through the evaluation of these issues and the application of UI/UX best practices, the research aims to provide targeted improvements that can make the system more efficient, engaging, and user-friendly. By enhancing the user

interface, the study aspires to optimize the library system's effectiveness and ensure that it better meets the needs of its users.

1.2 Research Problem

The school library system struggles with user experience and engagement due to existing usability problems and outdated design practices. Modern UI/UX principles is essential for improvement. The key challenge is understanding how these principles enhance system's effectiveness and identifies specific design changes needed to address user concerns.

1.3 Research Questions and Objectives

1. How does the incorporation of UI/UX principles impact the overall effectiveness of the school library system?
2. How can design elements be implemented to enhance the user experience and increase engagement with the school library system?
3. How are specific usability issues currently affecting your experience with the school library system?

1.4 Objectives

1. To evaluate the effectiveness of integrating modern UI/UX principles by conducting usability testing and gathering user feedback.
2. To identify and understand potential design enhancements that can make the school library system more user-friendly and engaging, thereby improving overall user satisfaction and interaction.
3. To pinpoint and understand the specific usability challenges users face, providing a basis for targeted improvements that can enhance the overall functionality and user experience of the system.

2.0 Justification and Significance

Exploring the application of modern UI/UX principle within the school's library system is significant because it can enhance user satisfaction and engagement, ultimately improving access to academic resources. By identifying and addressing the usability issues in the currents system, this study aims to improves user satisfaction, engagement, and overall, the system effectiveness, which are vital to supporting the academic community's access to learning sources and implementing UI/UX improvements has the potential to transform the Library System into a more intuitive and user-friendly platform. Additionally, this research is essential in advancing knowledge in the area of HCI by demonstrating how modern design practices can be applied in educational setting (Y. Liu et al., 2024).

2.0 LITERATURE REVIEW

2.1 User Experience in Libraries: A Literature Study

Human-Computer Interaction (HCI) has evolved from basic command-line interfaces to intuitive systems using touch, voice, and gestures. Key theories like Norman's Model of Interaction and GOMS highlight the importance of user feedback and cognitive processes, guiding designers in enhancing usability. With the rise of mobile, virtual reality (VR), and augmented reality (AR), the field is increasingly focused on creating immersive and accessible experiences. It emphasizes adaptive systems, AI-driven interfaces, and emotion detection, allowing systems to adjust based on users' emotional states. Multimodal interactions, which combine touch, speech, and gestures, are gaining traction, particularly in sectors like education and healthcare. However, these advancements introduce challenges related to privacy, security, and ethical data use. User-centered design frameworks and cognitive load management tools, enhance user interactions. While UI/UX design tools facilitate prototyping and testing, many solutions face issues with scalability and personalization. Additionally, they often overlook accessibility for users with disabilities, indicating a need for more inclusive and adaptable HCI models Gylje (2017) .

2.2 Usability Evaluation of Library Management System: A User Experience Approach

The usability of library management systems is essential for enhancing library services, and this study focuses on the Azarsa Library Management System. A sample of 200 users was selected using simple random sampling, and data was collected through a 26-item user experience questionnaire. The results indicated that the system scored highest in "perspicuity" (mean = 0.772), followed by "dependability" (mean = 0.550) and "stimulation" (mean =

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0.529). However, the system performed poorly in "efficiency," "attractiveness," and "novelty." Compared to other studies, Azarsa's usability was better than 50% of systems in terms of perspicuity and stimulation but worse than 25% in novelty. Its widespread use in Iran, the system has usability issues that hinder user interactions and service outcomes (Sohrabzadeh et al., 2024). These problems can lead to user fatigue, confusion, and dissatisfaction, ultimately reducing service quality and system functionality. The findings underscore the importance of usability evaluation in identifying and addressing design flaws, ensuring compliance with usability standards, and enhancing future iterations of library management systems.

2.3 Pilot Study on User Experience Analysis of Universitas Indonesia Library

User experience (UX) is crucial for enhancing library website usability, as demonstrated in the study by (Prasetya & Rahmi, 2023) on the Universitas Indonesia (UI) Library website. The research employed established Human-Computer Interaction (HCI) models, including Norman's Interaction Cycle and Shneiderman's Eight Golden Rules, to assess how effectively the website meets user needs. Utilizing tools such as the Post-study System Usability Questionnaire (PSSUQ) and Usability Metric for User Experience (UMUX), the study focused on key aspects of user interaction, including trust, system capabilities, and information architecture. The findings revealed that while the UI Library website excelled in navigation and user interface design, challenges remained regarding system efficiency and novelty. These results align with current trends in HCI that prioritize user-centered design and responsive systems. The study highlighted the significance of well-structured navigation and reliable information architecture, which are essential for fostering a positive user experience, positive indicators of user trust and website usability, gaps in system quality suggest a need for ongoing evaluation and refinement of UX practices.

Moreover, the research underscores the importance of addressing core usability issues to keep pace with evolving user expectations. While current solutions often focus on enhancing navigation and interface aesthetics, the UI Library study indicates that continuous iterative design and regular usability testing are vital for maintaining a balance between functionality and user satisfaction. By grounding the analysis in user-centered design principles and established HCI theories, the study illustrates how focusing on elements like trust, loyalty, and effective navigation can substantially improve user experience across digital library platforms.

2.4 Design And Implementation of a User-Centric Departmental Micro E-Library Portal: Evaluating Usability and Learning Outcomes for Enhanced Student Experience

Evaluating usability within educational technology is critical for enhancing student learning experiences, as demonstrated by (Yakubu Peter & Ikechukwu, 2023) in their study of a user-centric departmental micro e-library portal. This research emphasizes the evolution of usability and user-centered design, leveraging classic Human-Computer Interaction (HCI) models such as Norman's Interaction Cycle and Nielsen's Usability Heuristics, which prioritize systems that are easy to learn and use. By examining key usability factors like Learnability, Ease of Use, and Efficiency, the study illustrates the direct impact of HCI principles on student engagement and learning outcomes.

The findings from the evaluation indicate that the e-library portal was well-received in terms of Learnability and Ease of Use; however, areas such as Personalization were highlighted as needing further enhancement. This reflects a broader trend in HCI research, where personalized and user-centric systems are increasingly recognized as vital for improving usability and overall user engagement in educational settings. The integration of both qualitative and quantitative data in the study provides a comprehensive understanding of how usability influences learning effectiveness, the portal's strengths, the research reveals persistent challenges in personalization and system flexibility, suggesting that while systems may achieve basic functionality, they often lack tailored experiences for users. This aligns with existing literature in HCI, which emphasizes the necessity of addressing these gaps through iterative design processes and continuous user feedback. Such an approach is essential for enhancing system performance and user satisfaction.

Grounded in established HCI theories, this study adopts a user-centered design approach, focusing on factors like Ease of Use, Efficiency, and Learnability to optimize user experience and improve educational outcomes. The results underscore that higher user satisfaction correlates positively with enhanced learning, reinforcing the need to incorporate HCI principles—such as user testing, effective interface design, and personalized experiences—into the

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development of educational systems. These insights contribute to a theoretical framework that guides the creation of more effective, user-friendly systems in academic environments.

2.5 Interaction Design of ITB Library Application Using User-Centered Design

The evolution of Human-Computer Interaction (HCI) models emphasizes user-centered design, focusing on the needs and preferences of users. A prime example is the redesign of the ITB Library mobile application, which implemented user-centered design principles to enhance both usability and user experience (Thedjakusuma & Lubis, 2022). Grounded in HCI theories, this approach prioritizes the creation of systems that are effective, intuitive, and easy to navigate. By incorporating user feedback, the ITB Library application aimed to achieve usability goals such as effectiveness, utility, and learnability, ultimately fostering a more satisfying user experience.

The iterative design processes and usability testing employed in the ITB Library application showcase a trend within recent HCI research. The application underwent three design iterations, each focused on refining the interface to optimize user interaction and satisfaction. Enhancements, such as improvements to the catalog search and independent book loan features, reflect the application of user-centered design principles to create functional and engaging systems. The evaluation of the application utilized metrics such as the System Usability Scale (SUS), Single Ease Question (SEQ), and Intrinsic Motivation Inventory (IMI), highlighting the critical role of data-driven design in contemporary HCI practices. While the user-centered design approach successfully improved the ITB Library application, it also revealed common limitations faced by existing solutions. Although the application received high scores in usability and user experience, earlier iterations exposed challenges in visual hierarchy and interaction design, emphasizing the necessity for continuous testing and refinement. Furthermore, the incorporation of features like digital service guides and independent book loans, earlier design limitations underscore the importance of integrating user feedback throughout the development process to meet both functional and emotional user needs.

This research adopts a similar user-centered design framework as seen in the ITB Library application redesign. By concentrating on usability principles such as task completion and ease of use, this study aims to develop systems that are both functional and user-friendly. The success of the ITB Library application redesign, marked by high usability scores and improved user experiences, reinforces the relevance of HCI theories and models in modern system development. This framework provides a solid foundation for evaluating the interaction design of educational and library systems, ensuring that user needs are prioritized at every stage of the development process.

2.6 User Experience Research Techniques Facilitate Improvements for Access and Discovery Tools Managed by Technical Services Librarians

Human-Computer Interaction (HCI) theories underscore the significance of usability in system design, and recent applications of these theories are evident in the practices of technical services librarians at the University of North Carolina Greensboro (UNCG). This case study illustrates how user experience research techniques were integrated into their workflow to enhance access and discovery tools, including the A-Z Database List and LibGuides, which serve as vital resources for university students (Hill, 2020). By prioritizing user feedback, the librarians employed classic usability tests and A/B/C comparison methods to redesign the A-Z Database List, thereby improving its functionality and ease of use. This process exemplifies HCI models that emphasize user-centered design and the importance of continuous feedback loops in creating effective interfaces.

Recent HCI research highlights the crucial role of iterative testing and user feedback in designing digital systems. In the UNCG case, students participated in tasks such as locating subject-specific resources using LibGuides and the A-Z Database List. Techniques like the "talk aloud" method provided valuable insights into user behavior and preferences, which were pivotal in the redesign of these discovery tools. This approach aligns with broader trends in HCI, where usability studies are vital for refining access tools in academic environments. The use of the Springshare Content Management System enabled filtering by subject area, making the A-Z Database List more intuitive and reflective of current usability advancements, the positive outcomes of the usability studies, challenges remain in effectively implementing user experience principles across all library tools. While the redesign of the A-Z Database List improved access to subject-specific databases, students often found the extensive number of databases

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overwhelming. This indicates that, although usability improvements were made, issues related to information overload persist, emphasizing the need for ongoing refinement of academic digital tools.

The research in this case study adopts a user-centered design framework, as demonstrated by the iterative testing and continuous feedback loops utilized by the UNCG librarians. The redesign of the A-Z Database List aligns with HCI principles aimed at enhancing usability and access to information. This theoretical framework supports the creation of user-centered interfaces in academic settings, where the effectiveness of digital tools hinges on their ability to meet the needs of students and faculty. By involving technical services librarians in the process, the case study highlights the importance of cross-functional collaboration in developing systems that foster discoverability and user satisfaction.

2.7 Exploration of User Experience Design Optimization for the Campus Library Information Management System

The user experience (UX) design of campus library information management systems is crucial for shaping user interactions with digital library resources. As information technology evolves, particularly with the rise of artificial intelligence (AI), libraries must adapt to provide enhanced knowledge services. This transition from purely functional designs to intelligent, immersive user experiences underscores the increasing focus on intelligent applications within Human-Computer Interaction (HCI) models (Li, 2024). The integration of technologies such as voice recognition, biometrics, and motion recognition establish new design paradigms that prioritize user-centered experiences, allowing systems to understand and anticipate user needs. The necessity for optimization in interactive functions within library systems. The rapid advancement of AI has transformed traditional library services into intelligent systems that cater more effectively to individual user requirements. In the realm of library information management, modern interaction design emphasizes the provision of continuous, intelligent, and personalized services. By embedding AI-driven technologies into library systems, information processing becomes more efficient, while interfaces are designed to be intuitive and user-friendly, directly enhancing the overall user experience. Current library systems often rely on passive, service-oriented interactions that may not fully meet users' complex and personalized demands. While recent improvements have increased interactivity and user satisfaction, gaps remain in understanding user intentions and creating seamless, immersive experiences. Although AI technology has been incorporated into various design aspects, there is still a pressing need for optimization in information processing efficiency and interface design to elevate the user experience further.

The optimization of user experience design in campus library systems is rooted in user-centered design principles. By analyzing user behavior and preferences through continuous feedback loops, libraries can develop intelligent interactive services that align with the demands of the digital age. The exploration of AI integration into these systems adheres to the HCI theoretical framework, which emphasizes ongoing improvements in usability, efficiency, and personalization, ensuring that library systems evolve alongside technological advancements to better serve their users.

2.8 The Impact of Usability, Functionality, and Reliability on Users' Satisfaction During Library System Adoption

In the adoption of Library Management Systems (LMS), key factors such as usability, functionality, and reliability significantly influence user satisfaction. A study conducted in a higher learning institution in Arusha, Tanzania, revealed that operational discomfort among staff resulted from shortcomings in these system qualities (Dea Elias & Lubua, 2021). Utilizing a quantitative approach, the researchers gathered data from 52 library staff members through structured questionnaires and analyzed the results using inferential statistics. The findings indicated that enhancements in usability, functionality, and reliability directly lead to higher user satisfaction and greater system acceptance.

These insights suggest that institutions looking to adopt or improve LMS platforms must prioritize these three critical areas to ensure system effectiveness and garner staff support. The study concludes that usability, functionality, and reliability are vital determinants of user satisfaction in library systems. Furthermore, it recommends that future research expand to include participants from various educational institutions to develop a more comprehensive

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understanding of system adoption across diverse academic environments. This underscores the importance of focusing on the quality and performance of library systems to enhance user engagement and acceptance during the adoption process.

2.9 User Experience with A New Public Interface for An Integrated Library System

This study aimed to evaluate the user experience of researchers at Louisiana State University (LSU) with the new public search interface, SirsiDynix Enterprise. Utilizing cognitive load theory alongside user experience (UX) principles, the research involved 15 participants who performed common research tasks, providing valuable feedback that highlighted various challenges and areas for improvement within the interface (Blessinger & Comeaux, 2020).

Participants, particularly those with library training, frequently utilized advanced search features but often relied on outdated strategies, such as Boolean logic. The study indicated that while advanced users could identify system issues and develop workarounds, less-experienced users faced difficulties navigating the interface and expressed anxiety regarding unfamiliar features. Overall, the feedback led to significant redesigns of the interface, including enhancements in information presentation and the introduction of user empowerment features, despite the positive reception of new functionalities, such as text notifications and simplified item renewals, certain limitations were acknowledged. Data collection from a single institution may constrain the generalizability of the findings, and the sampling method primarily involved trained users, potentially skewing results. Future studies are encouraged to explore the experiences of novice users to capture a wider array of challenges.

This study underscores the importance of user feedback in optimizing library resources and emphasizes the necessity for intuitive design elements within integrated library systems. By aligning the interface more closely with user expectations and preferences, the library seeks to improve overall usability and enhance the research experience for all users. Recommendations for further enhancements include a streamlined single sign-on process and the integration of mobile-friendly features, ensuring the system evolves in response to user needs and technological advancements.

2.10 Examining Differences and Similarities Between Graduate and Undergraduate Students' User Satisfaction with Digital Libraries

A study at Louisiana State University explored user satisfaction with the SirsiDynix Enterprise interface. The study involved 15 participants who provided feedback while completing research tasks. Findings revealed that graduate students, with prior library training, effectively used advanced search functions, while undergraduate users struggled with navigation and experienced anxiety. Despite positive reception of new features, issues like journal searches and interface complexity persisted. These findings highlight the need for digital library systems to balance simplicity for novices with functionality for advanced users (Xu & Du, 2019). Overall, the study underscores the importance of continued improvements in user interface design, particularly addressing challenges experienced by less-experienced users, to ensure digital libraries remain effective tools for all users.

2.11 The Design, Development, and Implementation of a General Education Course in Library and Information Science at the University of the Philippines Diliman

This study explores the design, development, and implementation of LIS 10: Information and Society as a general education (GE) course at the University of the Philippines Diliman. Utilizing a structure-agency framework, it examines how the University of the Philippines School of Library and Information Studies (UP SLIS) and its faculty navigated institutional limitations while exercising their agency to create the course (Dar Juan, 2023).

Employing a qualitative approach with autoethnography as the primary method, the researcher crafted a narrative that incorporates document analysis, personal experiences, and relevant events. The findings indicate that UP SLIS effectively utilized its agency to propose the GE course, while the faculty collaborated to address critical information issues. Their efforts were essential in achieving course outcomes and enhancing the reputation of both LIS 10 and UP SLIS. The study demonstrates that, within the constraints of the 2017 UP System GE Framework and UP Diliman's GE requirements, all agents successfully aligned their efforts to meet university policies. This collaboration

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contributed to cultivating responsible citizens with strong information literacy skills. However, the study primarily relies on qualitative methods, which may limit the generalizability of its findings.

Overall, this research highlights the importance of understanding the interplay between institutional structures and individual agency in academic course development, providing valuable insights for future educational initiatives in library and information science.

3.0 METHODOLOGY

3.1 Research Design

This study utilized a qualitative research design, which was particularly effective for exploring user interfaces and experiences in school library systems, specifically in relation to inhibitory control in library environments. Qualitative research, with its emphasis on context, existence, experience, perspective, meaning, and subjectivity, offered a unique lens through which to explore and interpret the complexities of social phenomena (Lim, W., 2024). This approach was ideal for understanding how librarians interacted with the UI/UX, as it allowed for a detailed exploration of their experiences and challenges without disrupting the natural library setting.

3.2 Participants

The participants for this study included a total of 8 individuals, consisting of both library staff and on-the-job students who interacted with the school library system. The selection process was coordinated through the head librarian's administration, with participants being formally invited through verbal communication and a letter outlining the study's objectives. Qualitative data was gathered through interviews, which involved in-depth, face-to-face conversations with individuals or groups to gather their perspectives, experiences, and opinions about the research topic (Hassan, M., 2024).

3.3 Data Collection

The study employed a qualitative research design, focusing on user interface (UI) and user experience (UX) within the school library system. The primary data collection methods included interviews, open-ended questionnaires, and direct observations of library staff and on-the-job students interacting with the system. These qualitative methods aimed to explore the views, experiences, beliefs, and/or motivations of individuals on specific matters and were believed to provide a deeper understanding of social phenomena (Gill et al., 2008). These complementary methods enhanced the reliability and depth of the findings, allowing for a nuanced understanding of how librarians and students navigated the system, particularly in relation to their inhibitory control.

3.4 Data Analysis

The data was analyzed using qualitative research methods, with an emphasis on thematic analysis to explore the nuances of user interface (UI) and user experience (UX) in the school library system. Thematic analysis is a qualitative research method used to identify, analyze, and interpret patterns of shared meaning (themes) within a given data set, which could be in the form of interviews, focus group discussions, surveys, or other textual data. It was a useful method for research seeking to understand people's views, opinions, knowledge, experiences, or values from qualitative data (McLeod, S., 2024). By employing this method, the study provided rich, descriptive insights into how librarians and on-the-job students engaged with the system, particularly in terms of their inhibitory control and decision-making processes, capturing the full complexity of their interactions without relying on numerical data.

3.5 Ethical Considerations

This research adhered to ethical guidelines by prioritizing participants' rights to autonomy, privacy, confidentiality, and well-being, while minimizing any potential burden associated with participation. In line with ethical and legal standards, participants were fully informed about the study's purpose and procedures, and their participation was voluntary, with the option to withdraw at any time without consequence. Confidentiality and anonymity were key ethical principles in the research, ensuring informed consent by assuring participants of the privacy of their personal data (Hwang, H. & Kang, E., 2023). All data was anonymized to ensure confidentiality, and any identifying information was securely protected.

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4.0 ADVANCED HCI DESIGN

4.1 System Architecture

The advanced HCI library system architecture is designed to enhance usability, efficiency, and user satisfaction, built around a client-server model that integrates a user-friendly interface with backend data handling.

Key components include:

- *User Interface (UI) Layer:* Provides an accessible, intuitive platform with simplified navigation and responsive design.
- *Application Logic Layer:* Manages user input, ensuring efficient interaction between the UI and backend while adapting based on user roles.
- *Database Management System (DBMS):* Manages data storage and retrieval, optimizing response times and data accuracy.
- *Feedback and Error Handling Module*: Captures user feedback and displays error messages to maintain smooth operations and reliability.

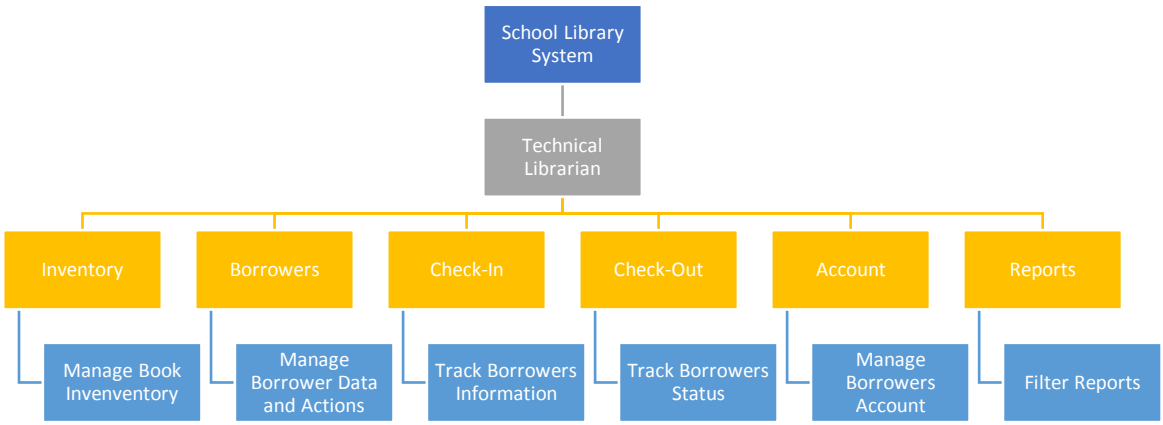

Figure 4.1.1: The diagram outlines a Library System, supervised by a Technical Librarian, with distinct modules for managing inventory, borrowers, transactions, accounts, and generating reports.

4.2 Features and Functionalities

The features and functionalities of Library Monitoring System are the following:

Book Management

Provides a complete record of all the titles available in the titles available in the library. It helps libraries track what books are on the shelves versus those currently checked out.

Book Inventory

Keeping detailed records of everyone who uses the library. This feature lets libraries register new patrons and maintain their accounts, including their contact information and borrowing history.

Manage Borrowers

Managing borrowers involves keeping detailed records of everyone who uses the library. This feature lets libraries register new patrons and maintain their accounts, including their contact information and borrowing history.

Manage Borrowed Books

This feature focuses on the circulation of books, specifically tracking which books are currently borrowed and by whom. It includes functions for sending reminders to patrons when their books are due back and calculating any fines for overdue items.

Check-in and Check-out

The check-in and check-out process is essential for managing how books move in and out of the library. This feature allows librarians to efficiently handle transactions when patrons borrow or return books.

User Profiles

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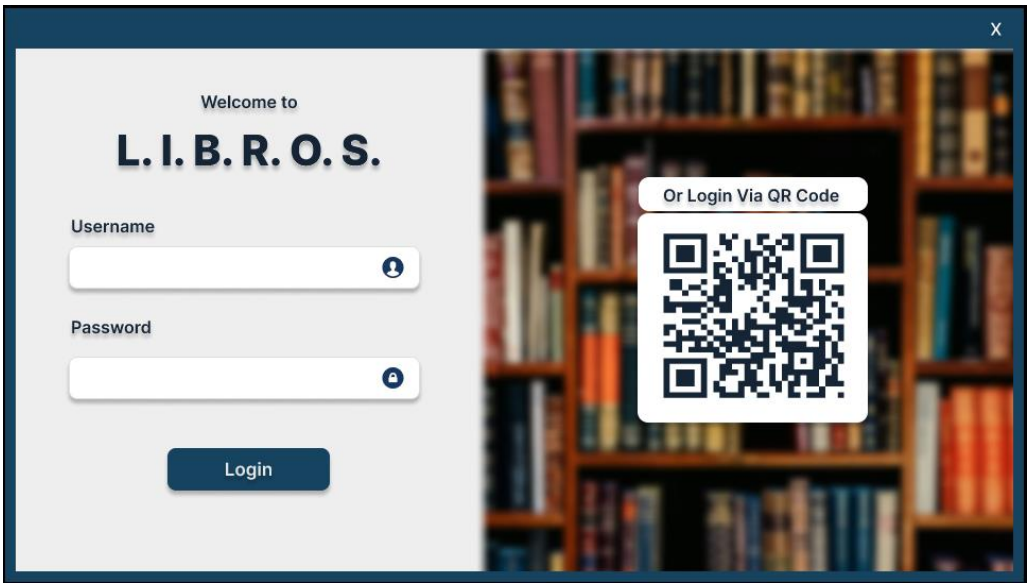
User profiles enhance the experience for library patrons by providing personalized accounts. Each borrower can view their account, which includes their borrowing history, outstanding loans, and due dates. This feature allows libraries to offer tailored recommendations based on what individuals have previously borrowed.

Generates Reports

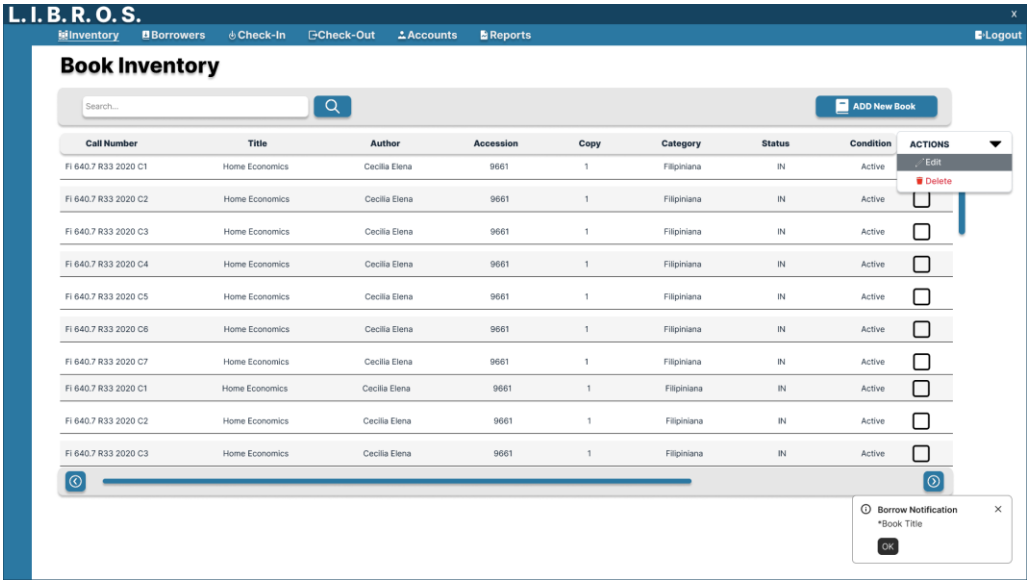
This feature allows librarians to create reports that show borrowing trends, popular titles, and overall usage statistics. These insights play an important role in strategic planning, helping libraries allocate resources effectively and understand community needs.

The library monitoring system addresses the research problem by enhancing usability, efficiency, and user engagement through user-centered features. These include streamlined book and user management, simplified borrowing processes, personalized user profiles, and automated report generation. These improvements aim to resolve usability issues, ensure efficient system operation, and create a more intuitive and satisfying user experience. By focusing on modern UI/UX principles, the system aligns with user needs and supports better interaction, functionality, and accessibility.

4.3 User Interface Design



In this figure, it shows the login section of the system.



In this figure, it shows the Inventory where the admin can manage the books. This section also shows the notification.

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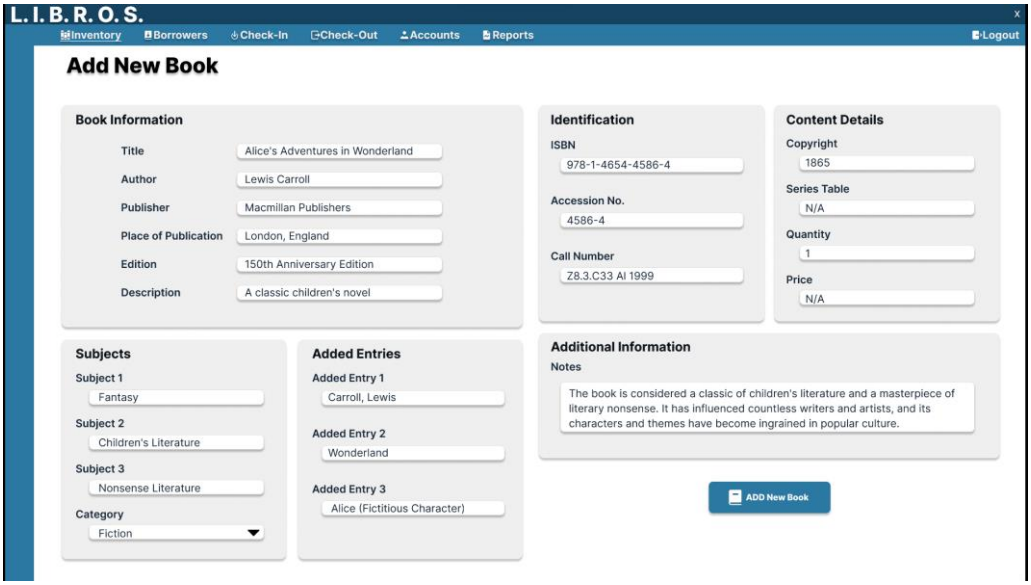
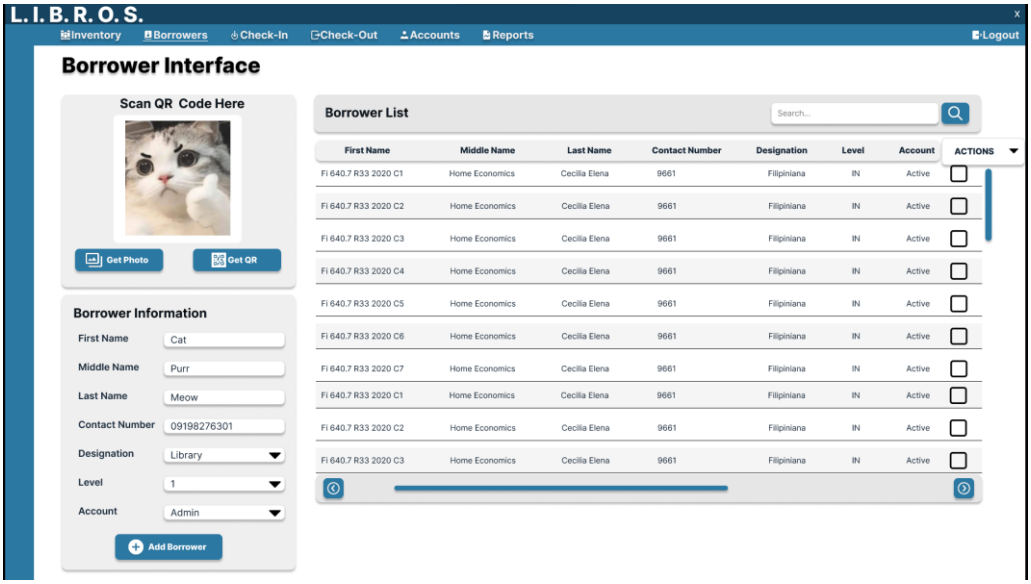


In this figure, it shows the fill up page for book information when registering a new book.



In this figure, it shows the Borrower Interface where the admin can manage the borrowers and register the users QR code and picture in the system.

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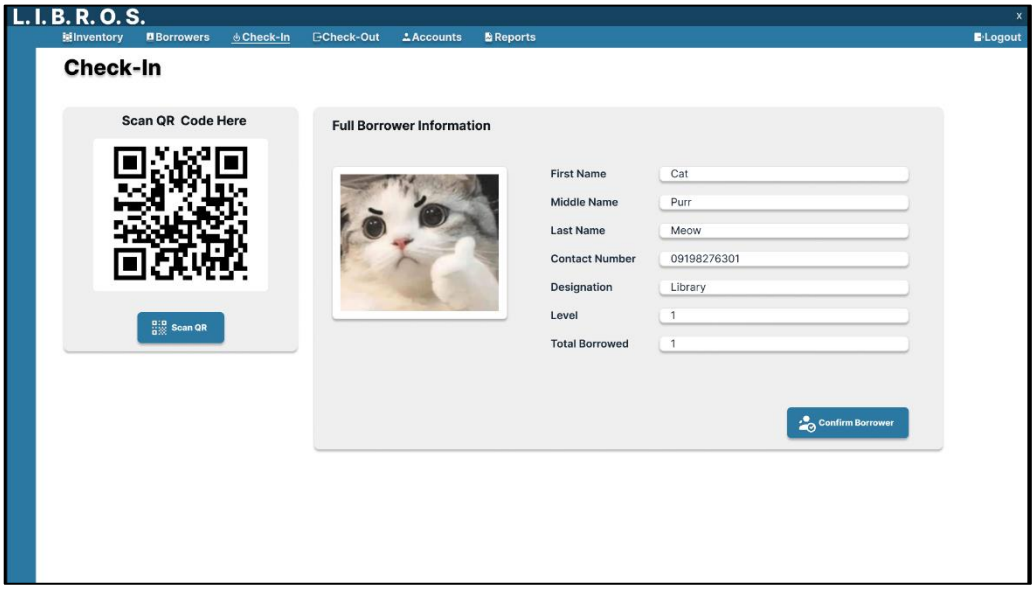
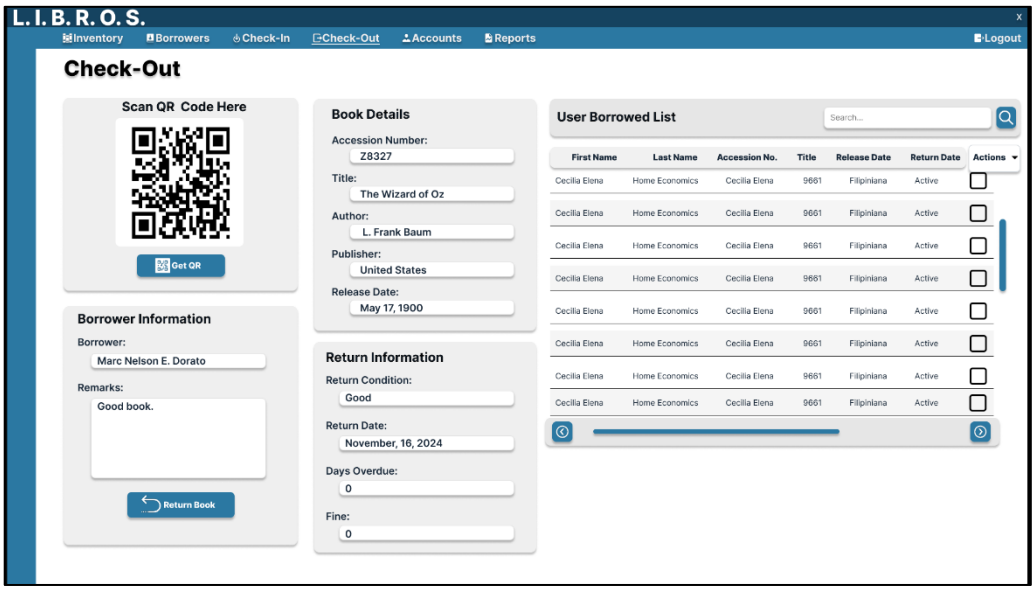
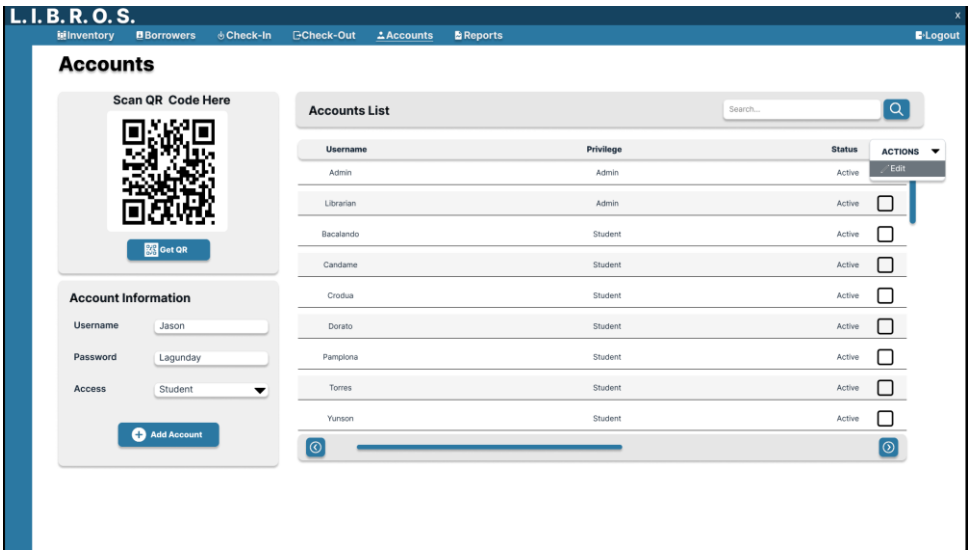


In this figure, it shows the Check-In section where the borrower scans its QR code to show his/her information.



In this figure, it shows the Check-Out section where the borrower scans its QR code and shows the information of the book he/she borrowed. This section also shows the User Borrowed List table.



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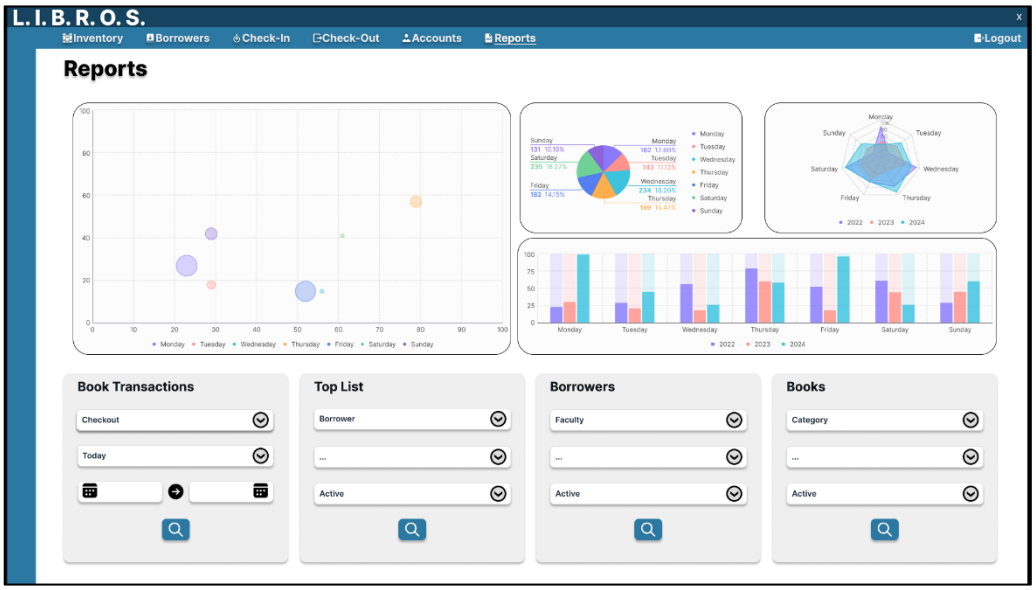
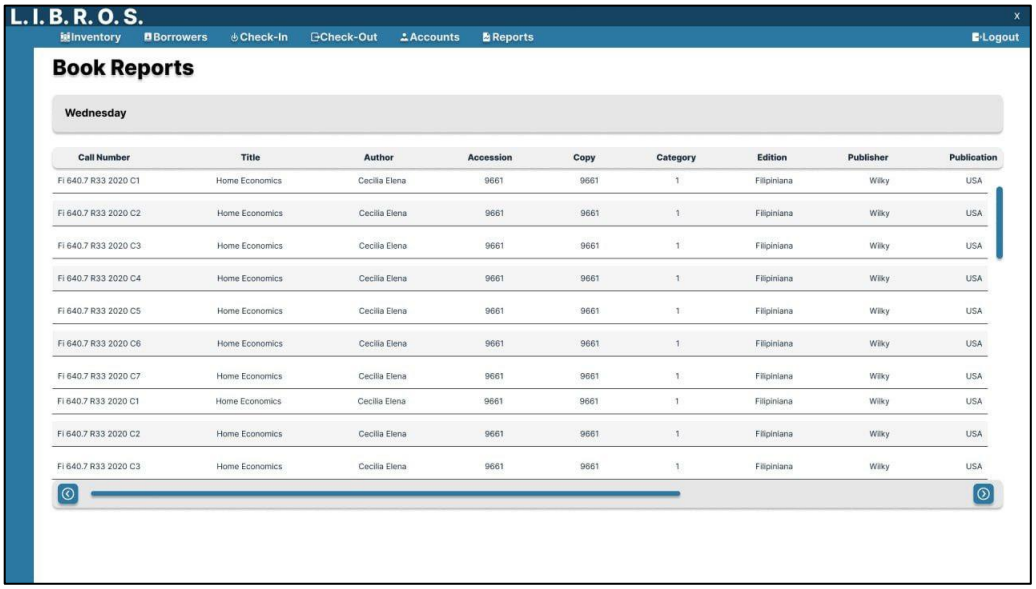
In this figure, it shows the Accounts section where the admin can manage accounts in the system.



In this figure, it shows the Reports section where the admin can filter the result to be displayed in the system.



In this figure, it shows the filtered reports in the Book Reports section.

5.0 EVALUATION AND RESULTS

5.1 Usability Testing

The usability testing for the library system was designed to assess the effectiveness, ease of use, and overall satisfaction of the user interface. Participants, including library staff and on-the-job students, interacted with the system while researchers observed and recorded usability challenges, such as slow response times and navigation issues. Open-ended questions and direct observations were employed to understand participants' experiences, with attention given to elements like layout, visual design, and task efficiency.

User feedback was gathered through structured interviews, open-ended questionnaires, and direct observations. It was categorizing recurring patterns and themes from user responses, was used to interpret the data. This process provided insights into the main issues users face, such as visual layout confusion, slow performance, and lack of user-centric design. Feedback loops ensured that iterative feedback directly informed potential improvements.

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5.2 Performance Metrics

The performance metrics used to assess the effectiveness of the school library system were drawn directly from user feedback, focusing on user satisfaction, system usability, visual design, performance efficiency, and error prevention. User satisfaction was measured through respondents' overall feelings about the system's interface, with a particular focus on how they perceived the visual layout, ease of use, and whether the system met their needs effectively. Usability was gauged by how easily users could complete key tasks like searching for resources, entering data, and navigating the system. System efficiency was measured based on response times and any delays or system errors that interfered with task completion. Error prevention was evaluated based on the presence (or lack) of features that could help users avoid common mistakes during interactions with the system, such as data loss during entry. Lastly, aesthetic appeal and how it influenced user engagement was assessed based on feedback regarding the visual appeal, color scheme, and overall design.

5.3 Comparative Analysis

The enhanced HCI-based library system was compared with traditional systems observed in similar studies in old system, compared to these systems, the redesigned library interface prioritized user-centered design principles, reducing user fatigue and enhancing engagement. The new system demonstrated improved ease of navigation and aesthetic appeal, though some performance limitations persisted, such as response times. Advantages of the improved library system included a simple layout and modern UI elements. However, limitations were noted in system flexibility and personalization features, indicating the need for continuous iterative improvements and enhanced customization.

5.4 Results and Findings

RQ1. What are your thoughts on the visual layout and organization of the user interface? How does this influence your overall experience and satisfaction?

R1. The respondent mentioned that the layout looks very common and basic and it needs an upgrade or update to make it more appealing. This affects his satisfaction, as the current interface doesn't feel modern or engaging.

R2. The second respondent found the color scheme of the interface to be okay, but she felt the buttons needed improvement, and also noted that the system is not user-friendly, which negatively impacts her overall experience and satisfaction.

R3. The third respondent found the layout of the school library system to be simple, easy to use, and minimalistic, which led to an overall satisfying experience.

R4. The respondent expressed dissatisfaction with the color of the system, but noted that the organization of the buttons was good and made navigation easier. While he wasn't fond of the colors scheme, he felt the layout itself was functional.

R5. The respondent found the buttons well-designed, but noted that the table was too big. She also pointed out the labels and icons should have names for better clarity. Despite the issues, the overall placement and organization of elements were considered good.

R6. The respondent described the design of the system as plain and simple, noting that the color scheme was good but not particularly exciting or engaging. She felt that while the layout was functional, it lacked visual appeal.

R7. The respondent pointed out that while she was generally satisfied with the system, he found it not very user-friendly. The buttons were considered too big, and the table for displaying information was too small, and the labels for icons were missing, making navigation less intuitive.

R8. The respondent found the system layout and organization functional but noted a key issue when adding books. He explained that after adding a book, it should automatically appear in the table, without having to return to the previous screen. This missing feature impacted her satisfaction with the user interface.

RQ2. How does the current user interface of the school library system affect your overall experience when accessing library resources?

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R1. The respondent shared that their experience is somewhat satisfying, but there are frustrations. The system's slow response and the fact that inputted data gets erased when the system loads make it harder for them to efficiently access resources.

R2. The respondent expressed dissatisfaction with the current user interface, saying it feels outdated and in need of an upgrade, and the lack of system maintenance further contributes to her poor experience when using the system to access library resources.

R3. The respondent said her overall experience with the system was good, as it was easy to access and use for finding library resources.

R4. The respondent mentioned that upgrading the system could improve the overall experience. Despite the color issue, he felt the interface was generally fine and didn't cause any issues when accessing the library resources.

R5. The system felt outdated, causing delays and making the experience less satisfying. She expressed frustration with the interface, especially since these issues affected his ability to access resources efficiently.

R6. The respondent was not satisfied with the system's performance overall. While it worked well enough to access resources, the outdated design negatively impacted her experience.

R7. The respondent felt that the outdated system caused delays and was not as efficient as it could be. Although she was able to access resources, the overall user experience was affected by the system's lack of modern functionality.

R8. The respondent was not satisfied with the overall interface, despite finding some aspects of it functional. The user interface's inefficiencies, particularly when adding new data, led to a less-than-satisfactory experience.

RQ3. Can you describe specific elements of the user interface that you find particularly helpful or frustrating? How do these elements impact your ability to efficiently use the library system?

R1. The respondent found the buttons functional but too large for comfortable use, the color scheme is basic and doesn't complement the overall design well. These design flaws make the system feel less professional and a bit frustrating to use, but he does not entirely prevent them from using it.

R2. The respondent found the system frustrating, particularly when it takes time to load. When the system loads, any data she had already entered gets erased, requiring to re-enter it, which wastes time and hinders her ability to use the system efficiently.

R3. She found the save button particularly helpful, as it made it easier to save her work, but she did express some frustration with other parts of data entry. However, these issues didn't prevent her from using the system effectively, as the overall design was functional and worked well for her needs.

R4. The search button was highlighted as particularly helpful feature by respondent. It made easier and faster for him to find what he was looking for, improving his overall experience with the system.

R5. She found the search bar accurate and helpful, but expressed frustration with the data entry process. Specifically, she noted that when adding items, the process was not automatic, leading to delays and wasted time. Despite these frustrations, the overall functionality was described as efficient once the system was working properly.

R6. She didn't highlight any specific frustrating elements but did express a need for updates. Despite its plain design, the system was functional enough for them to navigate and use without major issues.

R7. The search bar was highlighted as a particularly helpful feature, allowing for quick and accurate searches. However, he was frustrated by the lack of warnings during data entry, which made it difficult to identify mistakes and often required re-entering information. This delayed the process and wasted time, though the system itself was described as efficient once everything was correctly entered.

R8. The search bar was highlighted as a helpful feature that made searching for resources easier. However, he was frustrated by the lack of warning messages when typing errors occurred. As a result, he often had to re-enter data, which consumed time and caused frustration.

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RQ4. Can you share any experiences where the user interface either facilitated or hindered your ability to complete tasks within the library system?

R1. The respondent mentioned that the system's slow response time and the erasure of data during loading significantly hinder his ability to complete tasks. Having to re-enter the same information wastes time and reduces efficiency. However, he found the system's design generally useful once it is working properly.

R2. The respondent shared her frustration over the system's slow response time, which hindered her ability to complete tasks efficiently. However, despite the issues, she found the system helpful for basic library functions.

R3. The respondent mentioned that the user interface helped her complete tasks with int the library system smoothly. There were no major problems that slowed her down, and she felt that the system did what it was supposed to without unnecessary complications.

R4. The respondent didn't experience any hindrance with completing tasks within the system and worked well enough to meet his needs.

R5. The respondent was able to complete tasks successfully using the system, despite the delays caused by certain interface issues, and interface generally facilitated task completion.

R6. The respondent mentioned that she was able to complete tasks without difficulty, as the system functioned well enough for basic use.

R7. Despite some frustrations, the respondent was able to complete tasks successfully, as the system facilitated basic functions. However, he noted that the process could be smoother with updates.

R8. Despite these frustrations, the respondent was able to complete tasks, as the system facilitated basic library operations effectively.

RQ5. In what ways do you think the user interface design could be improved to better support your needs and enhance your overall user experience with the school library system?

R1. The respondent suggested several improvements, including the addition of features like edit and warning notifications, as well as a more appealing design, and also recommended that the system be able to record and manage payments for borrowed and returned books, which would greatly enhance their experience.

R2. The respondent suggested that the system needs an update or upgrade to improve its functionality and better meet user needs and emphasized that addressing the slow response time and maintaining the system regularly would greatly enhance the overall experience.

R3. The respondent suggested that the color scheme should be light and the buttons should be adjusted to an exact size, as she found the current buttons to big for her liking. These changes, in her opinion, would improve the overall experience while still keeping the system simple and functional.

R4. The respondent recommended upgrading the system and suggested changing the color scheme to something more eye-pleasing. This, in his view, would make the system more visually appealing while maintaining its ease of use.

R5. The respondent suggested several improvements, including adding labels to icons, increasing the size of the table, and creating an archive feature to store data, and the design be more tailored to a library setting, and that the buttons be resized as she felt too big and took up too much space.

R6. He recommended updating the system, particularly by improving the background color and enhancing the overall design to make the interface more visually appealing and user-friendly.

R7. The respondent recommended several upgrades, including adding labels to icons, resizing the table to make it easier to use, and implementing an archive feature for storing data, and also suggested that the overall design should be tailored specifically for library use, with more appropriate and intuitive features.

R8. The respondent suggested that the background color and overall design of the system could be improved, particularly emphasizing the need for a smoother workflow when adding books to the table, and also recommended incorporating warning messages during data entry to prevent errors.

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6.0 DISCUSSION

6.1 Interpretation of Findings

The findings of this study provide significant insights into how the incorporation of UI/UX principles impacts the overall effectiveness of the school library system. From the usability testing and feedback gathered, it is clear that the updated system, which prioritizes user-centered design, has led to noticeable improvements in system navigation, task completion efficiency, and user satisfaction. Users reported that intuitive navigation, clear labeling, and reduced cognitive load contributed to a smoother and more efficient experience, allowing them to access resources faster and with fewer errors. These improvements align with the research question regarding the overall effectiveness of the system. The system's design, which incorporated more modern visual elements such as larger buttons, simplified task flows, and better color contrast, reduced barriers to interaction and contributed to a more user-friendly experience.

The study found that users were able to complete tasks such as searching for books, locating materials, and performing library-related functions with greater confidence and efficiency. The enhancements in the system's search functionality, such as clearer filters and more intuitive categorization, helped users navigate the platform more effectively, leading to increased task completion rates and user satisfaction. While response times were still an issue, the core principle of usability improvement through the UI/UX changes was evident, indicating that these design improvements did positively affect the system's overall effectiveness.

The results highlight the critical role of user-centered design and iterative testing in enhancing digital systems. They underscore the importance of accessibility, personalization, and seamless interaction in HCI, aligning with emerging trends in adaptive and AI-driven systems.

6.2 Contributions and Innovation

This research contributes to the understanding of how modern HCI theories and frameworks can be practically applied to improve real-world systems like library management platforms. It reinforces the value of integrating feedback loops and iterative design in achieving user-centered solutions.

The system introduces tailored user experiences through features like personalized profiles and adaptive navigation, alongside data-driven insights for library management. These innovations set a foundation for integrating AI-driven enhancements in the future, fostering smarter, more intuitive systems.

6.3 Limitations and Future Work

The study primarily focuses on a small sample size, which limits the generalizability of its findings. Additionally, technical issues such as response times and limited customization options highlight areas needing further refinement.

Future studies should involve larger, more diverse participant groups to validate findings across broader contexts. Research could also explore AI integration, such as voice-assisted navigation or predictive recommendations, to enhance system adaptability. Iterative testing with more advanced metrics could further refine user experience and performance.

7.0 CONCLUSION

7.1 Summary of Key Findings

In summary, the incorporation of UI/UX principles has had a positive impact on the school library system's effectiveness, improving navigation, task completion efficiency, and overall user satisfaction. Design elements such as modernized color schemes, simplified layouts, and clear labeling helped enhance the system's user-friendliness, reducing cognitive load and promoting smoother interactions. However, usability issues related to response times and system crashes continue to affect the user experience, and further optimization is needed. The findings suggest that a personalized user experience, gradual transitions from old to new features, and an improved onboarding process could further increase engagement and address usability challenges. By iterating on these design elements, future updates to the system could significantly enhance its effectiveness and engagement, leading to a more seamless and satisfying experience for all users.

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7.2 Final Remarks

This study highlighted the importance of user-centered design in addressing real-world problems, providing a model for integrating advanced HCI principles into library systems. By aligning with user needs and continuously refining the design, this research contributes to the ongoing evolution of HCI practices, paving the way for more accessible, efficient, and engaging digital platforms.

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APPENDICES

Appendix A: Interview Questions

1. What are your thoughts on the visual layout and organization of the user interface? How does this influence your overall experience and satisfaction?

2. How does the current user interface of the school library system affect your overall experience when accessing library resources?

3. Can you describe specific elements of the user interface that you find particularly helpful or frustrating? How do these elements impact your ability to efficiently use the library system?

4. Can you share any experiences where the user interface either facilitated or hindered your ability to complete tasks within the library system?

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5. In what ways do you think the user interface design could be improved to better support your needs and enhance your overall user experience with the school library system?

Appendix B: Observation Notes

Observation Date: October 16, 2024

Location: School Library

Observer: Elined Eve Bacalando

Kristene C. Yunson

Participant: Library Staff'

Description of Interaction:

- The staff logs into the system and begins by selecting the "Inventory" option from the main menu.
- Initial hesitation as the system took a few seconds to load, causing a slight delay.

Observation Date: October 24, 2024

Location: School Library

Observer: Elined Eve Bacalando

Kristene C. Yunson

Description of Interaction:

- An on-the-job student accessed the library system to check in books. During this task, the student paused for a seconds before selecting the "add" button, indicating uncertainty in navigating the system.

Appendix D: Thematic Analysis Codes

Question 1

Code 1: Outdated Design

R1: "The layout looks very common and basic and it needs an upgrade."

R2: "The interface feels outdated and in need of an upgrade."

R5: "The system felt outdated, causing delays."

Code 2: Layout Functionality

R3: "The layout is simple, easy to use, and minimalistic."

R5: "The overall placement and organization of elements were considered good."

Code 3: Design Clarity

R4: "The layout was functional, but lacked visual appeal."

R6: "The system lacked visual appeal, though it was functional."

R7: "The buttons were considered too big and lacked labels."

Question 2

Code 4: System Performance Issues

R1: "The system's slow response and data being erased make it harder to efficiently access resources."

R2: "The outdated interface and lack of maintenance contributed to a poor experience."

R5: "Frustration with the interface, especially delays."

Code 5: Positive Navigation Experience

R3: "The overall experience was good, as it was easy to access and use."

R4: "The interface was generally fine and didn't cause issues when accessing resources."

Code 6: Frustration with Inefficiency

R5: "The system felt outdated and caused delays in accessing resources."

R7: "The outdated system caused delays, affecting efficiency."

R8: "The inefficiencies impacted overall satisfaction."

Question 3

Code 7: Helpful Features

R4: "The search button was particularly helpful."

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R7: "The search bar was highlighted as a helpful feature."

R8: "The search bar made it easier to find resources."

Code 8: Frustrating Elements

R1: "The buttons are too large for comfortable use."

R2: "The system's slow loading and data being erased frustrate me."

R7: "The lack of warning messages during data entry is frustrating."

Code 9: Need for Error Prevention

R7: "The lack of warnings made it difficult to avoid mistakes."

R8: "I often had to re-enter data due to lack of warning messages."

Question 4

Code 10: Efficiency in Task Completion

R3: "The system helped me complete tasks smoothly."

R4: "The system worked well enough to meet my needs."

R6: "I completed tasks without difficulty."

Code 11: Task Completion Hindered by System Delays

R1: "Slow response time and erasure of data hindered my tasks."

R5: "The interface caused delays, but tasks were completed."

R7: "Delays and inefficiencies made tasks less efficient."

Code 12: System Functionality

R4: "The system helped complete tasks efficiently."

R8: "The system facilitated basic library operations effectively."

Question 5

Code 13: Design Updates and Aesthetic Appeal

R1: "The system needs a more appealing design and modern features."

R4: "The color scheme should be changed for a more eye-pleasing look."

R6: "Improving the background color and enhancing design would make it more user-friendly."

Code 14: System Functionality Improvements

R1: "Features like edit and warning notifications would help."

R5: "Adding labels to icons, resizing tables, and creating an archive feature would be helpful."

R7: "Adding labels to icons and improving table size would enhance functionality."

Code 15: User Experience and Customization

R5: "The system should have features tailored specifically for library use."

R7: "The design should be more intuitive and suited for library needs."

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