

Development and Evaluation of an Equipment Borrowing and Computer Inventory Management System for UPHSD-LP College of Computer Studies

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ABSTRACT

This study developed and evaluated a web-based equipment borrowing and computer inventory management system for the College of Computer Studies of the University of Perpetual Help System DALTA-Laguna (UPHSD-LP). The project addressed delays, inaccurate records, fragmented logbooks, and limited visibility of equipment availability associated with manual procedures. Guided by the System Development Life Cycle, the system integrated user management, borrowing requests, inventory tracking, condition reporting, administrative monitoring, and reporting functions. A quantitative developmental-evaluative design was employed. Thirty-eight purposively selected respondents participated in the system assessment: 30 college secretaries, two laboratory custodians, and six information technology experts.

A four-point questionnaire based on ISO/IEC 25010 quality characteristics was analyzed using weighted means and rank ordering. Results showed consistently strong evaluations across the assessed categories. Usability and dependability obtained the highest composite means (3.98), followed by compatibility and security (3.95), while functional suitability, performance efficiency, and maintainability each received a composite mean of 3.88. Respondents particularly valued the system's intuitive interface, stable operation, cross-platform access, access controls, and capacity to update inventory records efficiently. The findings indicate that the developed system offers a practical digital alternative to paper-based processes and can improve asset visibility, transaction efficiency, record accuracy, and accountability. Institutional adoption, user training, and sustained technical support are recommended.

Keywords: *equipment borrowing, computer inventory management, ISO/IEC 25010, asset tracking, web-based system, higher education*

INTRODUCTION

Higher education institutions increasingly depend on digital resources, computer laboratories, and specialized equipment to support instruction, research, and administrative operations. As the volume and value of institutional assets increase, paper-based recording methods become difficult to sustain. Manual logbooks can create delays in processing borrowing requests, inconsistencies in asset records, weak visibility of equipment availability, and difficulties in producing reliable reports for auditing and decision-making. These concerns are particularly important in colleges that manage multiple computer units and peripheral devices used by students, faculty members, and staff.

Digital transformation offers a practical response to these operational challenges. Automated resource management systems can centralize data, support real-time updates, and improve access to accurate information. Cloud-based inventory systems have been associated with better data synchronization and timely resource monitoring (Kim et al., 2021), while technology-enabled systems can improve institutional efficiency and user

satisfaction when their design responds directly to local operational needs (Suazo-Galdamés & Chaple-Gil, 2025). In higher education, reliable laboratory management also supports faculty productivity and responsible allocation of academic resources (Garcia et al., 2021; Hernandez et al., 2021).

At UPHSD-LP College of Computer Studies, the existing manual procedure for equipment borrowing and inventory monitoring depended heavily on paper forms and logbooks. These processes made it difficult to verify equipment status promptly, reconcile records, and retrieve transaction histories efficiently. To address these gaps, the present study developed and evaluated a web-based Equipment Borrowing and Computer Inventory Management System. The article examined the operational issues associated with the manual process and assessed the developed system using selected ISO/IEC 25010 software quality characteristics.

Literature Review

Automated Asset and Inventory Management

Automated inventory systems are designed to improve visibility, accuracy, and accountability by replacing fragmented manual records with centralized digital databases. Real-time tracking supports faster verification of equipment availability and reduces the risk of inconsistencies during audits. Kim et al. (2021) emphasized the value of cloud-based synchronization in maintaining timely inventory information across institutional settings. Similarly, Hernandez et al. (2021) highlighted the contribution of reservation and notification systems to more efficient laboratory resource utilization.

User Acceptance and Institutional Use

The effectiveness of an information system depends not only on technical performance but also on its usability and perceived value to users. Davis (1989) explained that perceived usefulness and perceived ease of use are central determinants of technology acceptance. In institutional contexts, support mechanisms and alignment with existing work practices also influence adoption (Tan & Wong, 2020). Systems intended for routine administrative use therefore need clear navigation, reliable performance, and functions that correspond directly to users' responsibilities.

Software Quality and System Development

A structured development process helps translate operational needs into functional software. The System Development Life Cycle (SDLC) organizes the progression from requirements analysis and design to development, testing, and evaluation. In this study, the evaluation stage was anchored on selected ISO/IEC 25010 quality characteristics, including functional suitability, performance efficiency, compatibility, usability, dependability, security, and maintainability. These dimensions provide a systematic basis for determining whether a developed system is practical, reliable, and sustainable in its intended setting.

Theoretical and Operational Basis

The study was informed by General Systems Theory, which views software, hardware, users, and organizational procedures as interdependent components of a functioning whole (von Bertalanffy, 1968). The developed system was also aligned with the principle that user-centered automated systems can improve operational efficiency when digital tools, institutional requirements, and user roles are integrated coherently. The operational framework followed an SDLC sequence consisting of analysis, design, development, and evaluation.

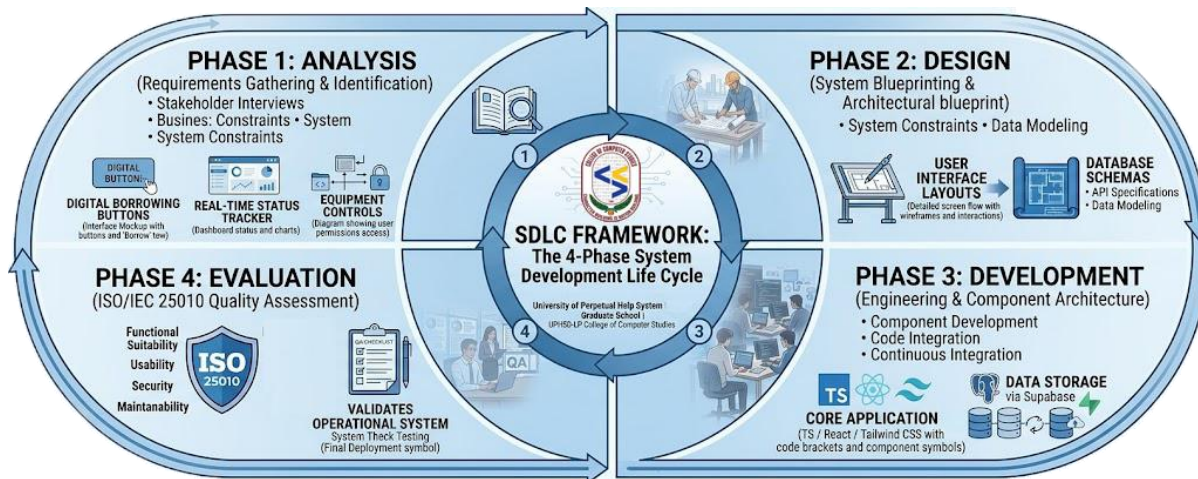


Figure 1. SDLC framework used in the development and evaluation of the system.

METHODS

Research Design

The study employed a quantitative developmental-evaluative research design. The developmental component focused on the creation of the web-based equipment borrowing and computer inventory management system, while the evaluative component measured respondents' assessments of the completed system. The development process followed four SDLC phases: analysis, design, development, and evaluation. During analysis, operational requirements and constraints were identified. The design phase translated requirements into interface layouts and database structures. The development phase implemented the functional application. The evaluation phase assessed software quality using selected ISO/IEC 25010 criteria.

Research Locale

The study was conducted at the College of Computer Studies of the University of Perpetual Help System DALTA-Laguna. The college provided an appropriate setting because it manages computer laboratories and institutional equipment that require systematic borrowing, monitoring, and inventory documentation.

Participants and Sampling Technique

The respondents were purposively selected because of their direct involvement in equipment-related processes or technical evaluation. A total of 38 respondents participated: 30 college secretaries, two laboratory custodians, and six information technology experts. College secretaries assessed administrative workflows and borrowing procedures, while laboratory custodians and IT experts evaluated operational feasibility and technical quality.

Table 1. Distribution of Respondents

Respondent Group	Frequency	Role in the Evaluation
College secretaries	30	Assessed administrative workflow and equipment borrowing functions
Laboratory custodians	2	Assessed inventory monitoring and laboratory operations
Information technology experts	6	Assessed system quality and technical performance
Total	38	

Research Instrument

A researcher-developed questionnaire was used to evaluate the system. The instrument applied a four-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree). Its items were organized according to selected ISO/IEC 25010 quality characteristics: functional suitability, performance efficiency, compatibility, usability,

dependability, security, and maintainability. The forced-choice scale was used to encourage respondents to indicate a clear judgment regarding each system characteristic.

Table 2. *Interpretation of the Four-Point Evaluation Scale*

Assigned Point	Numerical Range	Response	Verbal Interpretation
4	3.25-4.00	Strongly Agree	Very effective
3	2.50-3.24	Agree	Effective
2	1.75-2.49	Disagree	Moderately effective
1	1.00-1.74	Strongly Disagree	Not effective

Data Gathering Procedure

Permission and informed consent were obtained before data collection. Respondents completed the evaluation questionnaire after reviewing and using the developed system. Responses were gathered anonymously and aggregated for analysis. The evaluation focused on the system's operational usefulness, technical performance, and perceived suitability for institutional use.

Data Analysis

Weighted mean and rank ordering were used to summarize the respondents' evaluations. Composite means were interpreted using the four-point scale. The analysis emphasized the relative strengths of the system across the selected ISO/IEC 25010 quality characteristics.

Ethical Consideration

Participation was voluntary. Respondents were informed of the purpose of the study, and confidentiality was maintained by collecting responses without personally identifying information. Data were used only for research and system-evaluation purposes.

RESULTS AND DISCUSSION

Operational Issues in the Manual Process

The assessment of the existing manual workflow identified three recurring concerns. First, processing time was prolonged because borrowers completed physical forms and laboratory personnel verified transactions using archived logbooks. Second, record accuracy was vulnerable to incomplete entries, unreadable handwriting, and inconsistencies in serial numbers or return dates. Third, equipment availability was difficult to determine promptly because staff needed to review logbooks or conduct physical checks. These findings justified the development of a centralized system that could provide faster retrieval, real-time updates, and an auditable transaction history.

Evaluation of the Developed System

The developed system received consistently favorable evaluations across all assessed ISO/IEC 25010 categories. Composite means ranged from 3.88 to 3.98, corresponding to a very effective or strongly agreed evaluation. Usability and dependability obtained the highest composite means (3.98), indicating that respondents found the interface intuitive and the system operationally reliable. Compatibility and security followed with composite means of 3.95, reflecting effective cross-platform access and appropriate protection of institutional data. Functional suitability, performance efficiency, and maintainability each received a composite mean of 3.88, confirming that the system met the primary requirements of equipment borrowing and computer inventory management.

Table 3. Summary of ISO/IEC 25010-Based System Evaluation

Quality Characteristic	Composite Mean	Verbal Interpretation	Rank
Usability	3.98	Very effective	1
Dependability	3.98	Very effective	1
Compatibility	3.95	Very effective	3
Security	3.95	Very effective	3
Functional suitability	3.88	Very effective	5
Performance efficiency	3.88	Very effective	5
Maintainability	3.88	Very effective	5

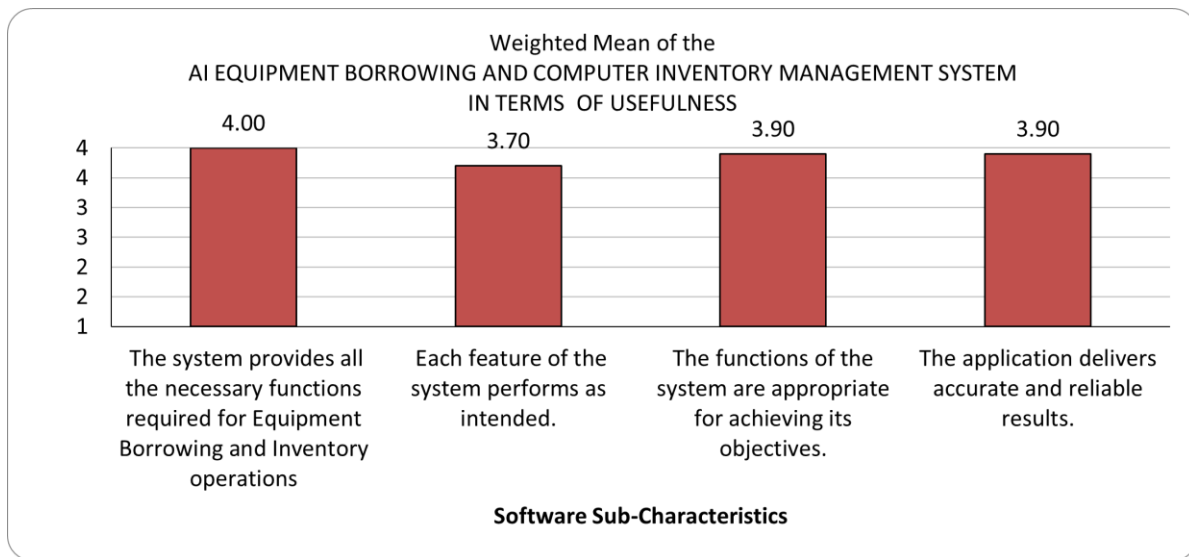


Figure 2. Functional suitability evaluation of the developed system

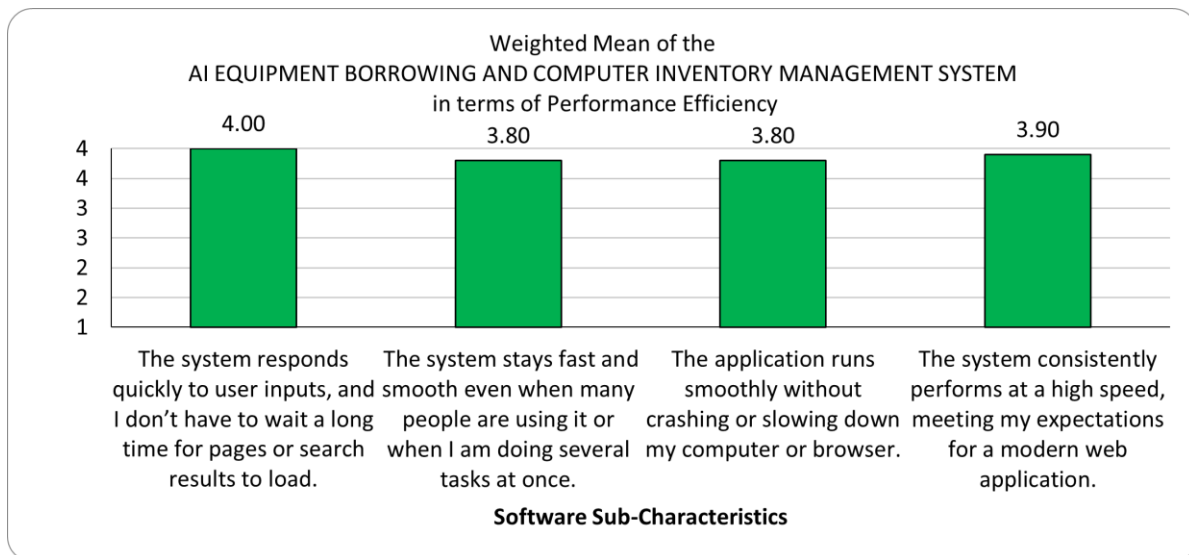


Figure 3. Performance efficiency evaluation of the developed system

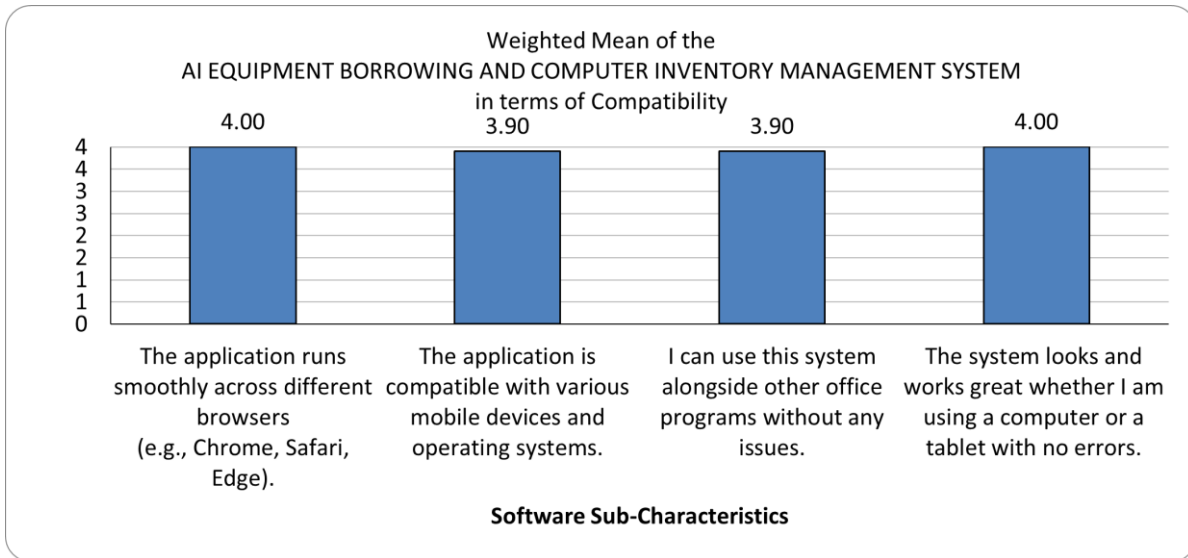


Figure 4. *Compatibility evaluation of the developed system*

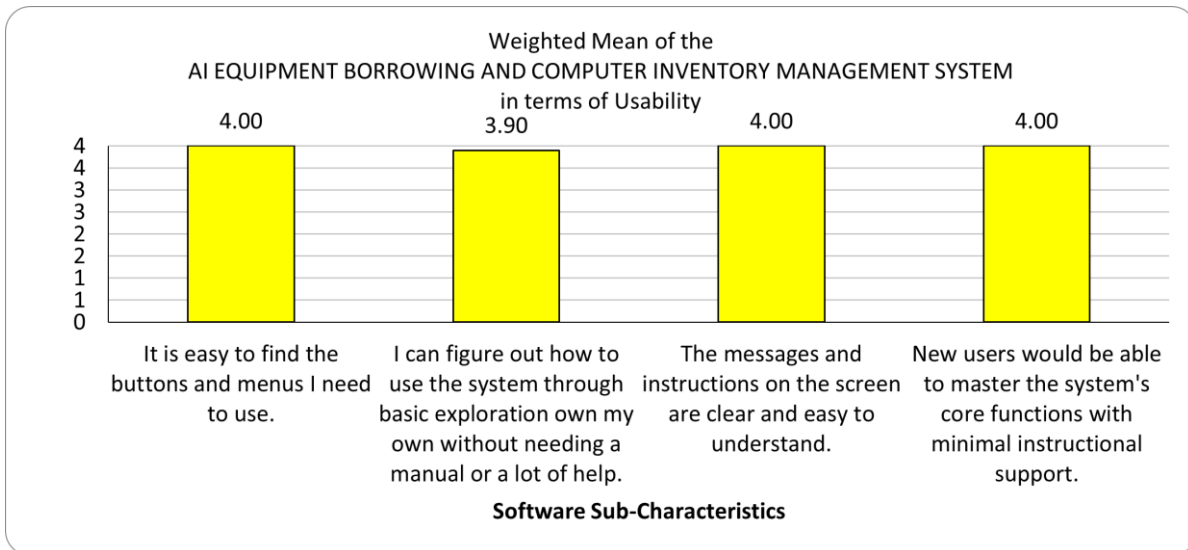


Figure 5. *Usability evaluation of the developed system.*

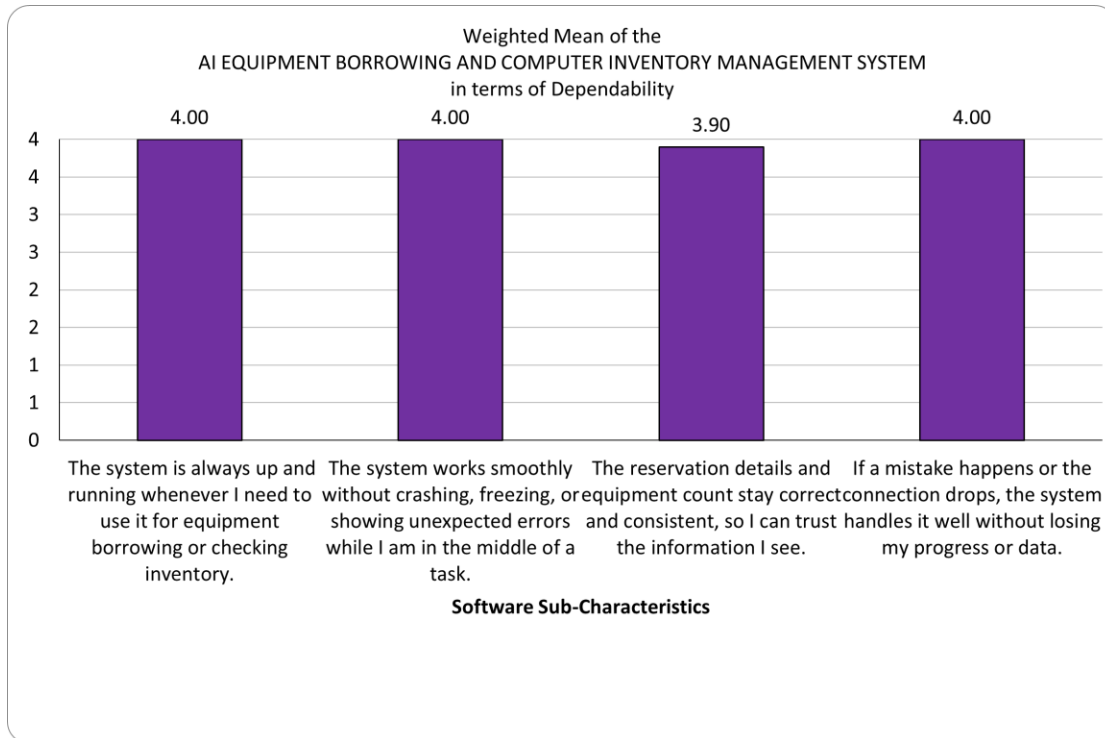


Figure 6. Dependability evaluation of the developed system

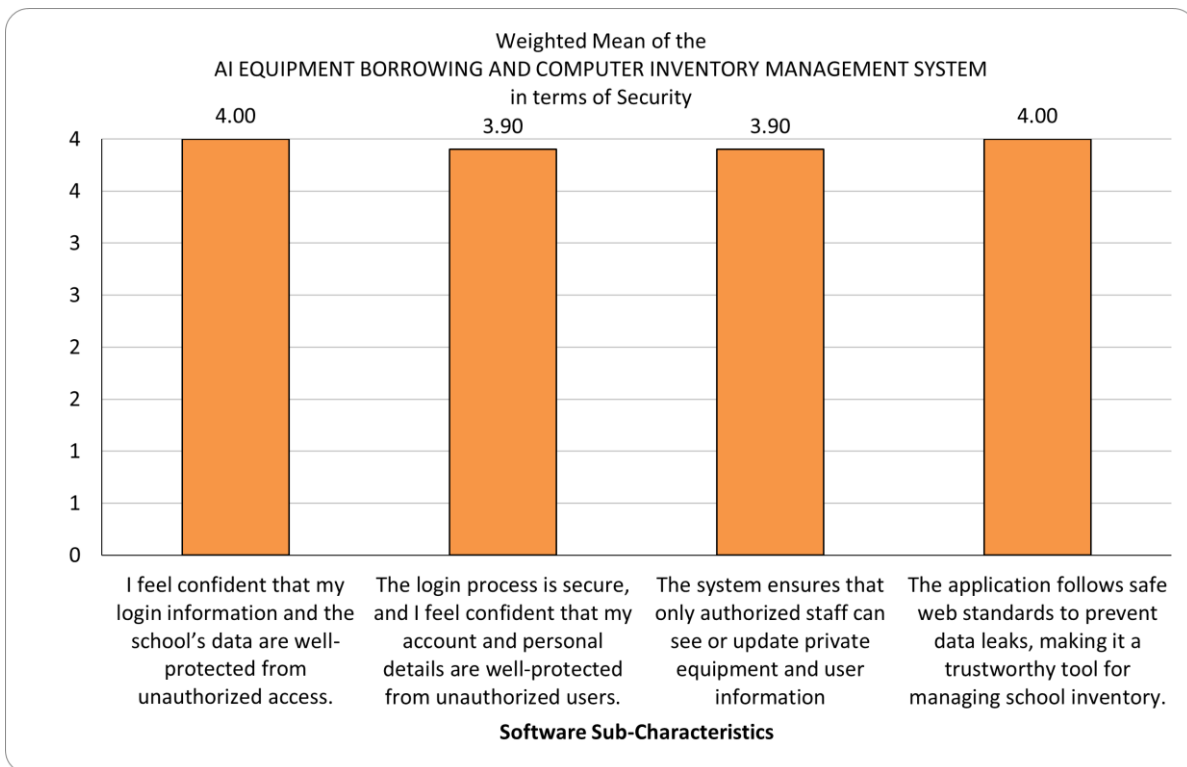


Figure 7. Security evaluation of the developed system.

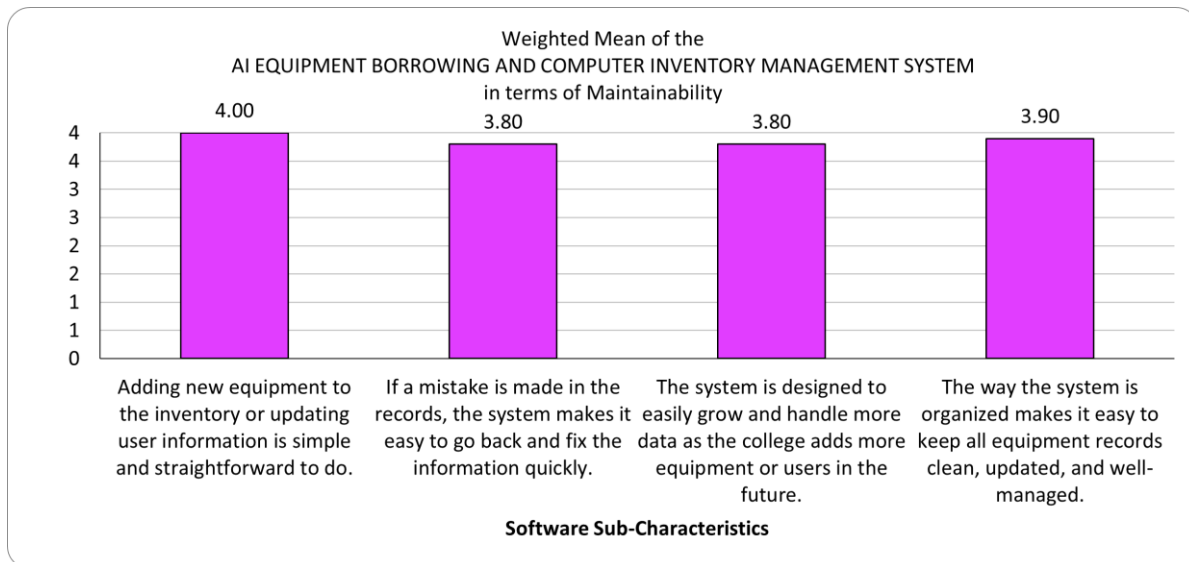


Figure 8. Maintainability evaluation of the developed system

Functional Suitability and Performance Efficiency

Functional suitability received a composite mean of 3.88. Respondents strongly agreed that the system provided the necessary tools for inventory and borrowing operations, aligned with institutional objectives, and produced reliable information. Performance efficiency likewise obtained a composite mean of 3.88. The strongest item was the system's responsiveness to user inputs and searches, which received a perfect mean of 4.00. These results show that the transition from manual procedures to a web-based workflow did not compromise speed or stability.

Compatibility, Usability, and Dependability

Compatibility was rated very effective (3.95), with strong assessments for browser support and the ability to operate across computers and tablets. Usability obtained a composite mean of 3.98. Respondents particularly valued the ease of locating menus, clarity of instructions, and minimal learning effort required for new users. This finding reflects the importance of perceived ease of use in technology acceptance (Davis, 1989). Dependability also achieved a composite mean of 3.98, indicating confidence in uptime, error handling, and the consistency of system operations.

Security and Maintainability

Security received a composite mean of 3.95. Respondents strongly agreed that the system protected school data, restricted unauthorized modifications, and supported safe web practices. Maintainability received a composite mean of 3.88, showing that respondents viewed the application as updateable and capable of accommodating future changes in inventory records and user information. These characteristics are essential for long-term institutional adoption because the sustainability of a system depends on both reliable protection and manageable updates.

Implications for Institutional Resource Management

The findings demonstrate that the developed system directly addresses the operational limitations of the manual process. A centralized dashboard improves visibility of equipment status, while electronic records reduce the risks associated with handwritten documentation. The system also creates a more reliable basis for reporting, auditing, and resource planning. Its favorable usability ratings are particularly important because institutional adoption depends on whether users can integrate the technology into their routine responsibilities with minimal disruption.

CONCLUSION

The developed Equipment Borrowing and Computer Inventory Management System provides a viable digital solution for UPHSD-LP College of Computer Studies. The manual process created delays, record inconsistencies, and limited visibility of equipment availability. In contrast, the developed web-based system centralized borrowing and inventory records and received very effective evaluations across all selected ISO/IEC 25010 characteristics. Its strongest features were usability and dependability, followed by compatibility and security. The results indicate that the system can support more efficient transactions, accurate monitoring, stronger accountability, and better institutional decision-making.

Recommendations

UPHSD-LP should consider adopting the developed system as the official platform for equipment borrowing and computer inventory management in the College of Computer Studies. Laboratory custodians, technical personnel, college secretaries, and other users should receive orientation and practical training before full implementation. The institution should allocate a continuing budget for hosting, database maintenance, security updates, and necessary peripherals. Future studies may evaluate the system after extended institutional use, compare transaction times before and after implementation, and explore additional features such as QR-based tagging, predictive maintenance, and integration with other campus resource-management platforms.

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