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Automating Academic Resource Management: Design, Implementation, and Quality Evaluation of an Integrated Faculty Loading, Room, and Class Scheduling System

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Abstract: The faculty loading, room, and class scheduling system is very important for every school since it plays a crucial role in managing class schedules. The manual approach requires more time and Labor to prepare and amend the department head-provided class schedules, instructor workloads, and room use. Researchers proposed an automated scheduling system that handles schedules with accuracy, speed, and effectiveness that will resolve Madridejos Community College's current issues. This mainly focuses on the faculty loading and room and class schedule development process, which includes subjects, course department, year, section, room availability, and instructors' load. The system helps to provide smoother operations when handling the school schedule for faculty members. The researchers employed the Rapid Application Development (RAD) methodology to guide the system development process. The system was evaluated by two groups of respondents: five 3 IT experts using the ISO/IEC 25010 software quality model, and ten 10 faculty members using the USE Questionnaire to assess usability. Results show that in terms of effectiveness and functionality of the system objectives, the total mean value is 4.81, which is interpreted as Very Satisfactory; in terms of the characteristics set in the ISO/IEC 25010 Software Quality Model, the total mean value is 4.55, which is interpreted as Very Satisfactory; and in terms of usability, both IT experts and faculty members rated the system Very Satisfactory, with overall mean

scores of 4.59 and 4.62 respectively. The researchers recommend that future studies expand the system's scope to include additional academic departments. The researcher's system would serve as a guide and source code to the next researchers.

Keywords: Academic Automation, Faculty Loading, ISO/IEC 25010, Rapid Application Development, Scheduling System, Usability Evaluation

I. INTRODUCTION

Academic scheduling is essential to maintaining educational institutions' efficiency and order. Students' learning, the effective utilization of resources, and the overall productivity of schools are all affected directly by class scheduling, teacher loading, and room assignment. Timetable management is a controversial but core administrative activity at tertiary learning institutions, normally saturated with timetabling clashes, resource wastage, and communication breakdowns [1]. Similarly, research on balancing lecturer workload and student timetables found that implementing an optimal scheduling framework revealed a 58.3% improvement in workload equity, a 51% reduction in student idle time, and a 29.3% boost in classroom utilization efficiency [7]. At Madridejos Community College, the majority of these scheduling duties are done by hand, which takes considerable time and is prone to errors, including poor classroom usage, overlapping class schedules, and incorrect faculty loads.

Timetable management at tertiary learning institutions is often saturated with timetabling clashes, resource wastage, and communication breakdowns. These challenges are typically associated with conventional scheduling by hand. However, research has shown that automated scheduling systems receive greater satisfaction and usability ratings from users compared to manual methods. By minimizing clashes in classroom assignments, instructors, and lecturers, such systems enhance administrative effectiveness and reduce administrative burden while providing transparency and adaptability in scheduling [1].

By utilizing modern technology to manage academic scheduling tasks, automated systems have demonstrated superior accuracy and efficiency. An automated system using evolutionary algorithms and multi-objective optimization was developed to create conflict-free schedules, demonstrating that such systems can save administrators time, improve academic operations, and enhance experiences for both staff and students [3]. A novel slot-filling algorithm for automated timetable generation was introduced, reporting that automated systems are far more efficient than manual systems and ensure flexibility and accuracy in assigning courses, classes, and faculty [5]. Additionally, association rule mining algorithms have been incorporated into teaching management systems, achieving 98.12% course selection satisfaction and 91.91% scheduling efficiency [10]. These solutions improve report generation, minimize scheduling conflicts, and facilitate necessary adjustments. However, several existing systems are either too complicated or were not designed with the specific needs of a particular institution in mind.

This study focuses on developing a faculty loading, room, and class scheduling system specifically for Madridejos Community College. The system aims to provide a reliable, efficient, and user-friendly solution to help administrators manage faculty workloads, room assignments, and class schedules more effectively.

Objectives of the Study

1. To design and develop an automated faculty loading, room, and class scheduling system for Madridejos Community College with the following functional capabilities:

1.1 To generate and display conflict-free class schedules, room assignments, and individual instructor loads.

1.2 To enable efficient management of master data and the production of academic reports.

1.3 To provide a centralized dashboard for institutional overview and ensure online accessibility.

1.4 To evaluate user satisfaction with the developed system based on its functional effectiveness.

2. To assess the quality of the developed system based on the ISO/IEC 25010:2011 Software Quality Model [4].
3. To evaluate the usability of the developed system in terms of usefulness, satisfaction, ease of use, and ease of learning, following the USE Questionnaire framework [6].

Conceptual Framework

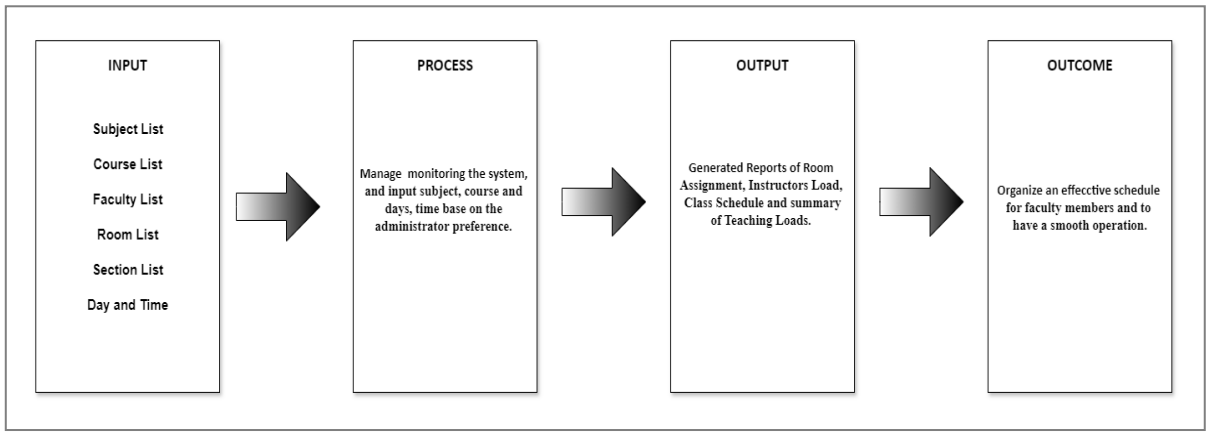

Figure 1. Conceptual Framework of the study

The study followed an Input–Process–Output–Outcome (IPOO) model:

- Input: Faculty data, subjects, courses, sections, rooms, and time slots.
- Process: Scheduling management, validation, conflict detection, and report generation.
- Output: Class schedules, instructor loads, room assignments, and teaching summaries.
- Outcome: Efficient scheduling process, reduced errors, and improved administrative productivity.

II. METHODS

Research Design

This study employed a developmental research design, which focuses on the design, development, and evaluation of an information system intended to solve an identified organizational problem [8]. The Rapid Application Development (RAD) model was adopted to enable iterative development, continuous user feedback, and faster system deployment. The adoption of a structured development methodology ensured systematic quality control throughout the software development lifecycle.

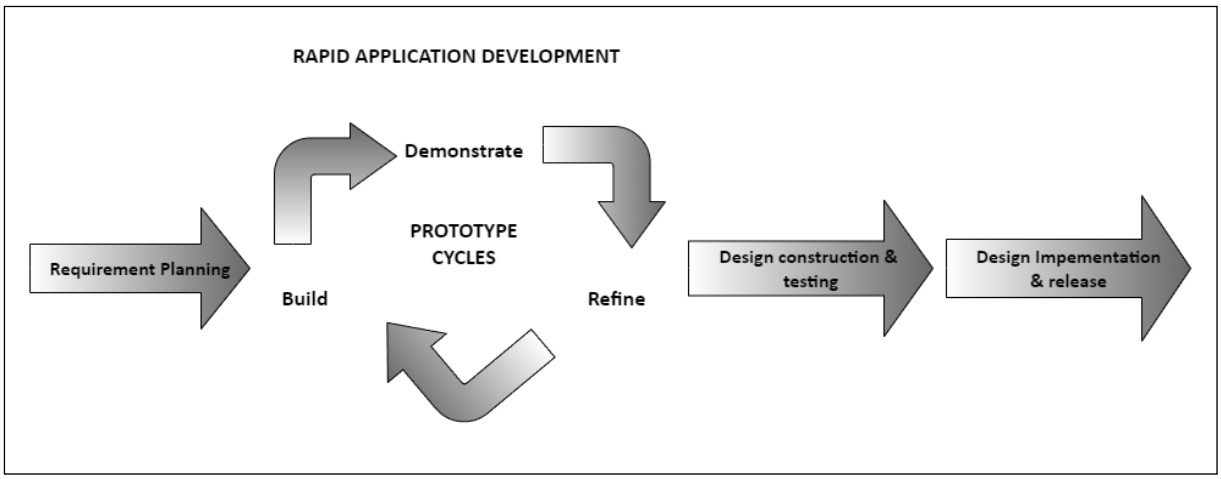

Figure 2. Rapid Application Development

The RAD model was implemented through the following phases:

1. **Requirement Planning** – Identification of existing scheduling problems and definition of system objectives through consultation with administrators and faculty members. Following a thorough needs assessment approach, researchers sought to understand the specific challenges faced by Madridejos Community College. User feedback collected through questionnaires demonstrated greater satisfaction and usability with automated scheduling processes than with conventional scheduling by hand, while significantly reducing administrative burden [1].

2. P**rototype Cycle (Demonstrate, Refine, Build)** – Iterative design and development of system modules, with regular demonstrations and feedback from stakeholders. This prototyping approach allows for continuous refinement based on user input, resulting in systems that better meet actual user needs by avoiding collisions between teaching hours and lecture rooms while regulating academic activities.

3. **Design Construction and Testing** – Coding, integration, and functional testing of system features, including scheduling, conflict detection, and report generation. Comprehensive testing methodologies for automated scheduling systems informed the testing protocols used in this study. Automated systems utilizing novel slot filling algorithms are far more efficient than manual systems and ensure flexibility and accuracy in assigning courses, classes, and faculty [5].

4. **Design Implementation and Release** – Final deployment of the system and evaluation by IT students and users. The system was deployed with appropriate user training and documentation.

Data Collection Instruments

Two primary instruments were used to evaluate the system:

1. **Expert Evaluation Checklist** based on the ISO/IEC 25010 Software Quality Model, assessing functional suitability, performance efficiency, compatibility, reliability, and security. The ISO/IEC 25010 standard defines eight product quality characteristics that provide a comprehensive framework for software evaluation, making it an appropriate choice for this study [4].

2. **Usability Survey using the USE Questionnaire**, measuring usefulness, ease of use, ease of learning, and satisfaction. This instrument was developed and validated specifically for usability research, identifying that users evaluate products primarily using three dimensions: usefulness, satisfaction, and ease of use, with ease of learning as a related but distinct factor [6].

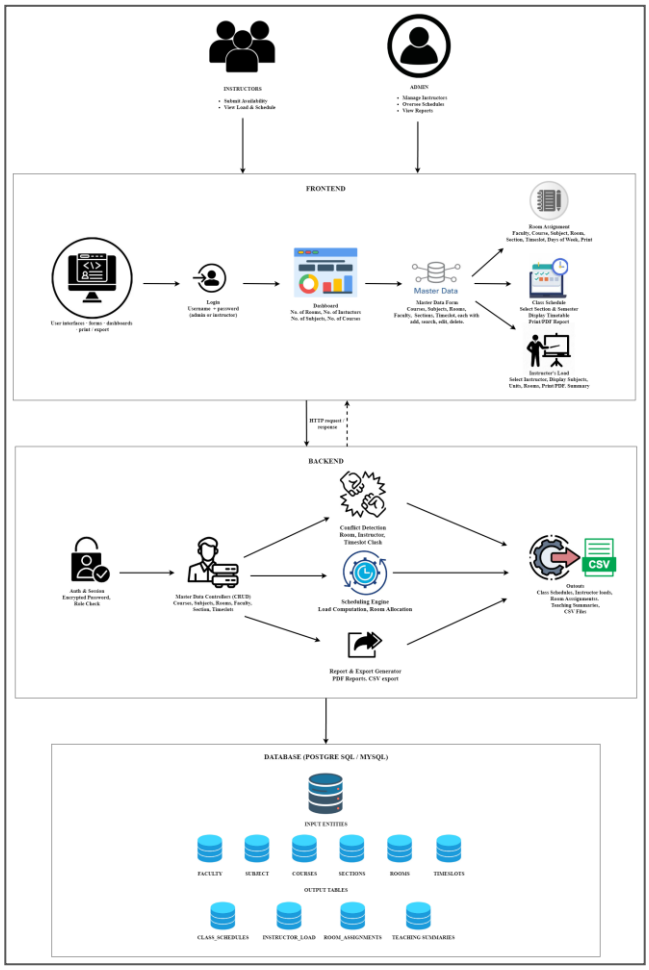

Figure 3. System Architecture

Application Architecture for the Faculty Loading, Room, and Class Scheduling System exemplifies the general architecture of the system with regard to the devices used and the faculty members and chairman who can use the implementation system. An application architecture outlines how programs behave in a school, with a particular emphasis on how they communicate with users and with one another.

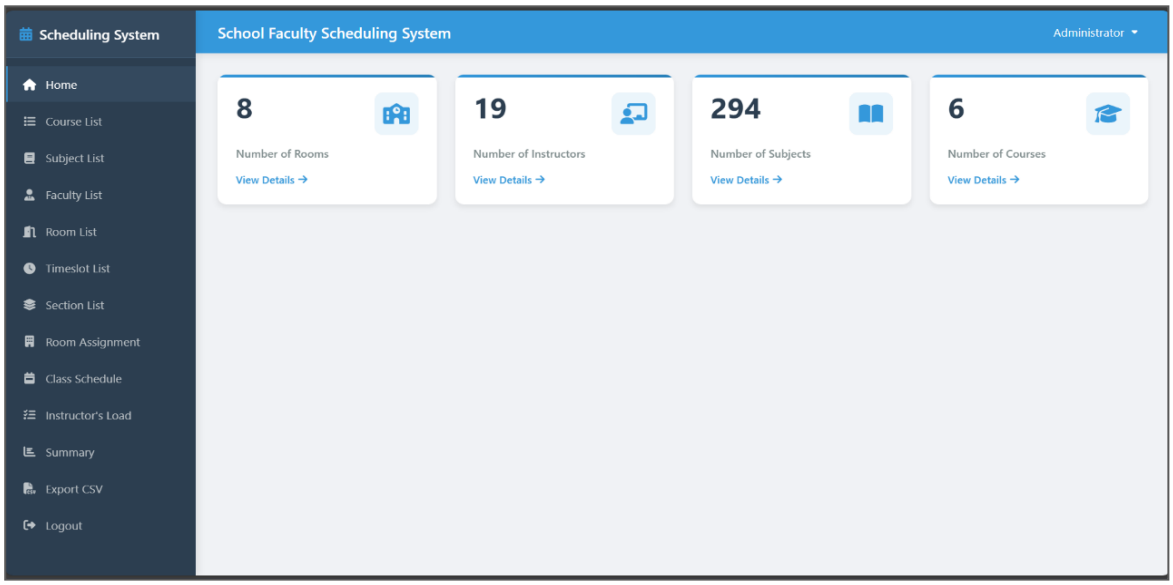

Figure 4. Shows the Dashboard- display no. of Rooms, no. of Instructors, no. of Subjects, no. of Courses

Figure 4 depicts the portion of the Faculty Loading, Room, and Class Scheduling System where administrators can view the number of rooms, instructors, subjects, and courses. This dashboard design follows the principles for effective data visualization in academic scheduling systems, supporting the finding that automated systems minimize clashes of classroom assignments, instructors, and lecturers while enhancing administrative effectiveness.

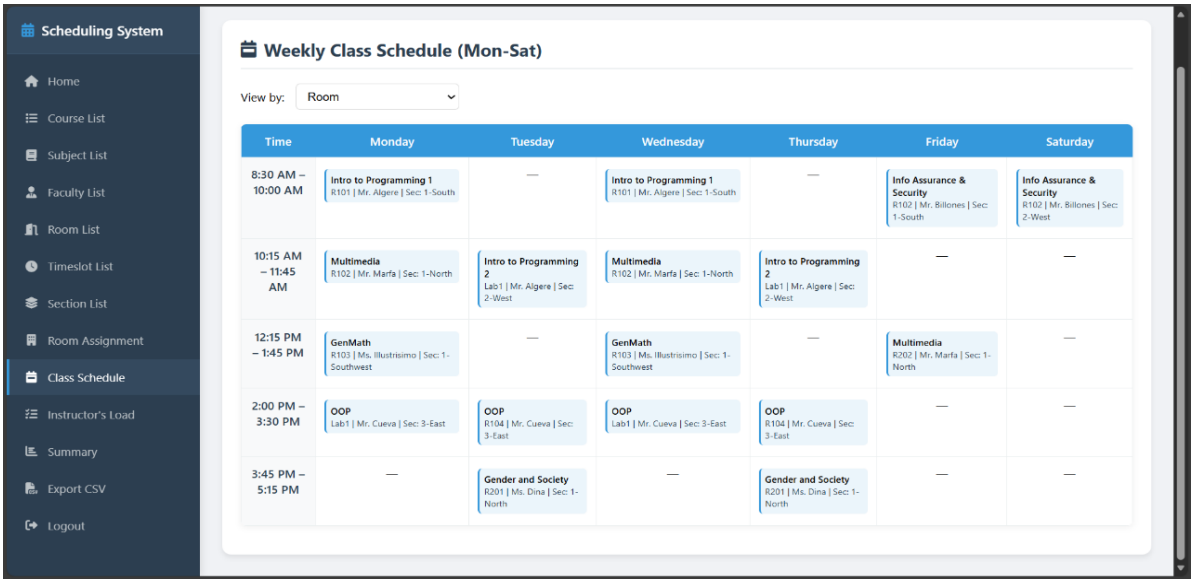

Figure 5. Weekly Integrated Class Scheduling Interface

The Weekly Class Scheduling Interface displays the consolidated timetable of subjects, sections, instructors, and room assignments. This integrated module enables automated conflict-free scheduling and centralized academic resource coordination. The design of such integrated scheduling systems is supported by research on optimization techniques. For instance, studies using evolutionary algorithms and multi-objective optimization have shown that automated scheduling can save administrators time, improve academic operations, and enhance experiences for both staff and students [3]. Additionally, teaching management systems

incorporating association rule mining algorithms have demonstrated superior efficiency, achieving 98.12% course selection satisfaction and 91.91% scheduling efficiency [10].

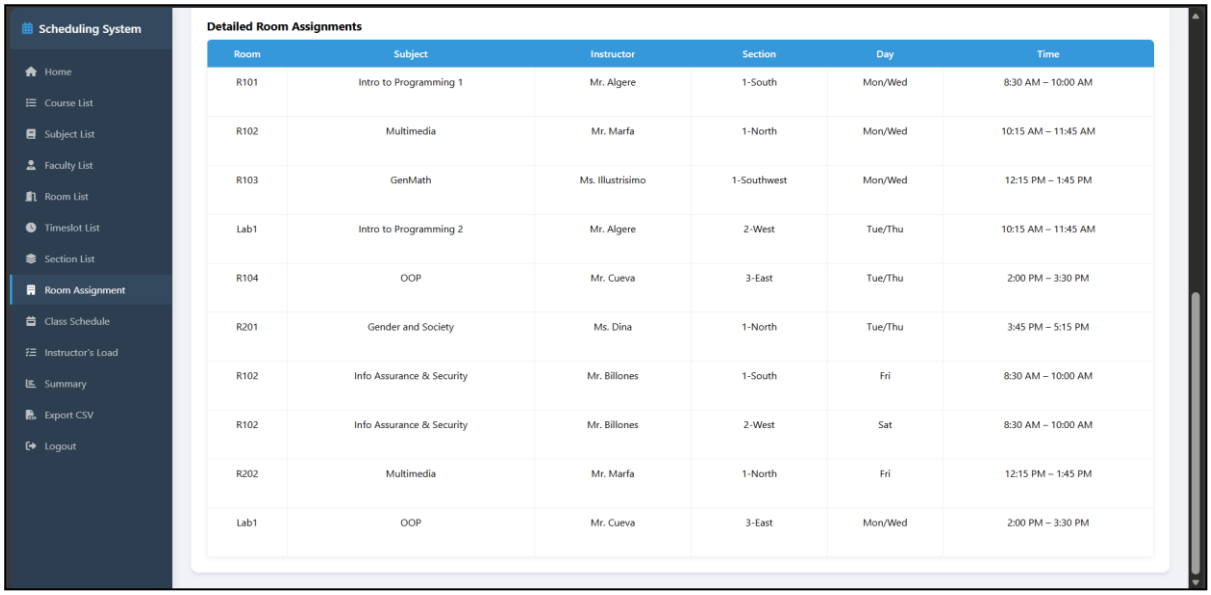

Figure 6. Room Assignment Interface

Figure 6 depicts the Detailed Room Assignment Interface of the Faculty Loading, Room, and Class Scheduling System, where administrators can view and manage the specific allocation of rooms to courses. The interface presents a comprehensive table displaying room assignments with the following details: room number (e.g., R101, R102, Lab1), subject title (e.g., Intro to Programming 1, Multimedia, OOP), assigned instructor (e.g., Mr. Algere), section (e.g., 1-South), day schedule (e.g., Mon/Wed, Tue/Thu, Fri, Sat), and time slots (e.g., 8:30 AM – 10:00 AM). This module enables administrators to efficiently track room utilization across different subjects, sections, and time blocks while ensuring conflict-free scheduling. Effective room utilization is a critical component of institutional efficiency, a principle supported by research on optimizing faculty workloads and room utilization using heuristically enhanced algorithms [2].

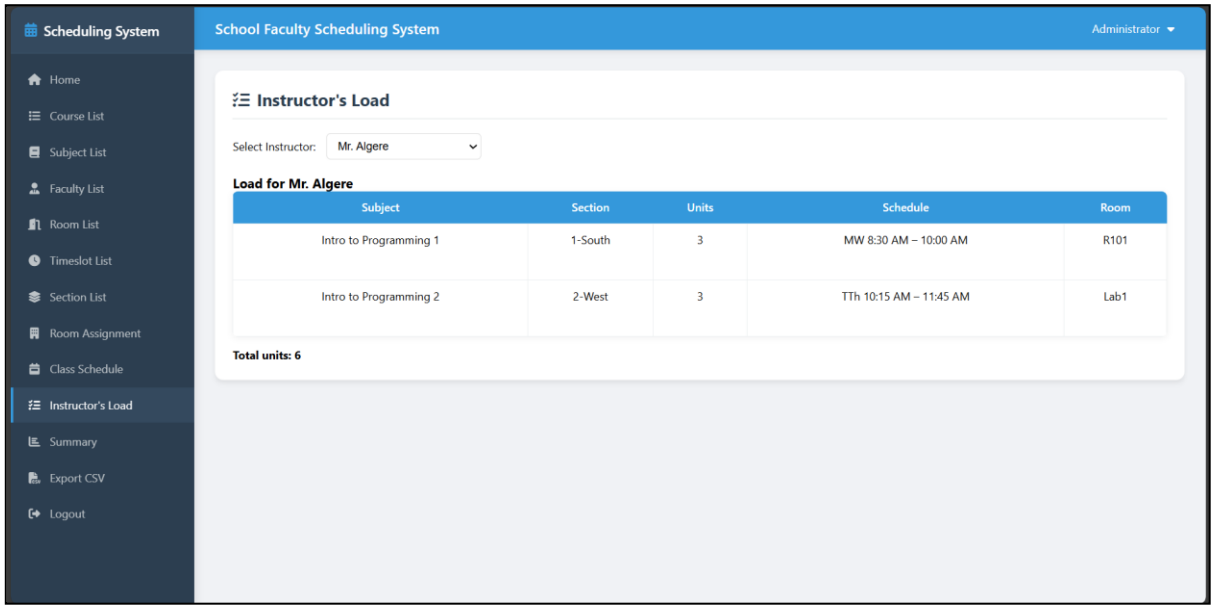

Figure 7. Instructor Load Management Interface

The Instructor Load Interface presents the assigned subjects, sections, units, schedules, and room allocations for each faculty member. This module ensures balanced faculty workload distribution and supports automated teaching load computation. Systematic workload management can achieve up to 58.3% improvement

in workload equity, which was a key design consideration for this interface. Research has also demonstrated a 29.3% boost in classroom utilization efficiency through optimized scheduling frameworks [7].

III. RESULTS

The developed system includes modules for course, subject, room, faculty, section, and timeslot management. It features a dashboard, reporting tools, conflict alerts, and CSV export functionality. Evaluation results are summarized below:

TABLE I
SYSTEM EFFECTIVENESS BASED ON USER EVALUATION

Evaluation Criteria	Mean	Verbal Interpretation
1.) Display Class Schedule, room assignment and Load Display	4.93	Excellent
2.) Data Management and Report Generation	4.49	Very Satisfactory
3. Dashboard and Online Accessibility	4.83	Very Satisfactory
4.) Overall Satisfaction	4.67	Very Satisfactory
Total Mean	4.81	Very Satisfactory

Table I presents the evaluation results on the system's effectiveness based on user responses. The criteria assessed include the system's capability to create room assignments, display class schedules and teaching loads, manage data entry and editing, generate printed reports, provide online accessibility, and present dashboard information. The overall mean of 4.81 indicates that users found the system to be Very Satisfactory in fulfilling its core functional objectives, with perfect scores achieved for room assignment creation, instructor load accessibility, and online access.

TABLE II
SOFTWARE QUALITY EVALUATION BASED ON ISO/IEC 25010

Criteria	Mean	Verbal Interpretation
Functional Suitability	4.56	Very Satisfactory
Performance Efficiency	4.44	Very Satisfactory
Compatibility	4.58	Very Satisfactory
Reliability	4.50	Very Satisfactory
Security	4.46	Very Satisfactory
Total Mean	4.55	Very Satisfactory

Table II summarizes the software quality evaluation conducted by five IT experts using the ISO/IEC 25010 model. The system was assessed across five key characteristics: functional suitability, performance efficiency, compatibility, reliability, and security. All characteristics received mean scores within the Very Satisfactory range, with compatibility receiving the highest rating (4.58) and performance efficiency the lowest (4.44). The total mean of 4.55 confirms that the system meets international software quality standards.

TABLE III
USABILITY EVALUATION BASED ON USE QUESTIONNAIRE

Criteria	Mean	Verbal Interpretation
Usefulness	4.67	Very Satisfactory
Ease of Use	4.51	Very Satisfactory
Ease of Learning	4.58	Very Satisfactory
Satisfaction	4.58	Very Satisfactory
Total Mean	4.59	Very Satisfactory

Table III presents the usability evaluation results of the system based on the USE Questionnaire, which measures four key usability dimensions: usefulness, ease of use, ease of learning, and user satisfaction. The results demonstrate that the system achieved consistently high ratings across all usability criteria, with mean scores ranging from 4.51 to 4.67, all interpreted as Very Satisfactory. The overall mean score of 4.59 indicates that users perceive the system as highly useful, easy to operate, and easy to learn. These findings suggest that the system provides a user-friendly interface that supports efficient interaction and facilitates adoption by administrators and faculty members with minimal training.

IV. DISCUSSION

The evaluation results demonstrate that the developed faculty loading, room, and class scheduling system effectively addresses the challenges inherent in manual academic scheduling. With an overall mean effectiveness rating of 4.81 on a five-point scale (where 5 denotes "excellent"), the system successfully mitigates the errors, timetabling clashes, resource wastage, and communication breakdowns documented as characteristic of manual approaches. This finding corroborates prior evidence that automated scheduling systems reduce administrative burden and improve user satisfaction compared to conventional manual methods [1]. The system's perfect scores (5.00) for conflict-free room assignment and instructor load accessibility further align with research reporting a 58.3% improvement in workload equity and a 29.3% gain in classroom utilization efficiency through optimized scheduling frameworks [7].

The system's performance across functional categories is consistent with established research on automated scheduling solutions. The 4.93 rating for schedule display functionality supports findings that automated timetable generation offers superior efficiency, flexibility, and accuracy compared to manual processes [5]. Similarly, the high effectiveness ratings across all categories validate the assertion that systems employing evolutionary algorithms and multi-objective optimization improve academic operations while saving administrator time [3]. The 4.67 overall user satisfaction rating closely corresponds to the high satisfaction rates reported in intelligent scheduling systems incorporating algorithmic approaches, such as the 98.12% course selection satisfaction and 91.91% scheduling efficiency documented in related research [10].

Software quality assessment using the ISO/IEC 25010 model yielded a total mean of 4.55 across all characteristics: functional suitability (4.56), performance efficiency (4.44), compatibility (4.58), reliability (4.50), and security (4.46) [4]. These ratings confirm the system's adherence to international software quality standards and demonstrate robust design across both functional and non-functional requirements essential for institutional adoption.

Usability evaluation using the USE Questionnaire revealed strong performance across all dimensions: usefulness (4.67), ease of use (4.51), ease of learning (4.58), and satisfaction (4.58). These scores validate the system's intuitive design and confirm that it meets end-user needs effectively, aligning with the framework identifying these dimensions as foundational to user-centered product evaluation [6].

The system's technical foundation aligns with a bipartite modeling framework for timetable optimization, which conceptualizes scheduling as an NP-hard combinatorial problem. The implemented conflict detection algorithms operationalize this theoretical model, contributing directly to the perfect score for conflict-free room assignments. Modular architectures facilitate adaptation across departments, supporting system scalability [9].

Despite positive outcomes, the study's scope was limited to the information technology department, which may not represent scheduling complexities in other academic units. Distinct departmental constraints may require specialized heuristic approaches, such as the Heuristically Enhanced Whale Optimization Algorithm (HEWOA) described in prior work [2]. Research on evolutionary algorithms and multi-objective optimization demonstrates that scalable, flexible scheduling frameworks can accommodate evolving institutional requirements across multiple faculties [3].

Future research should address these limitations through long-term evaluation studies and development of student-facing modules, as recommended in existing literature. Research has documented persistent challenges with workload inequity and underutilization classroom even in institutions with advanced scheduling practices, reinforcing the need for ongoing system refinement [7] and adaptation through modular design approaches [9].

In summary, the findings confirm that the system fulfills its intended administrative functions while demonstrating strong potential for broader application, providing a foundation for future innovation and identifying clear pathways for continued enhancement.

V. CONCLUSIONS

This study successfully developed and evaluated a web-based faculty loading, room, and class scheduling system for Madridejos Community College using rapid application development methodology. The system effectively addresses the scheduling challenges inherent in manual processes, including timetabling clashes, resource wastage, and communication breakdowns [1]. These results align with prior research demonstrating that optimized scheduling frameworks can achieve significant improvements in workload equity and resource utilization [7].

Evaluation results demonstrated high effectiveness (overall mean of 4.81), confirming the system's capability to create conflict-free schedules, display instructor workloads, and generate comprehensive reports.

Software quality assessment based on ISO/IEC 25010 yielded a total mean of 4.55 across functional suitability, performance efficiency, compatibility, reliability, and security characteristics [4]. Usability evaluation using the USE Questionnaire achieved a total mean of 4.59 across usefulness, ease of use, ease of learning, and satisfaction dimensions [6]. These findings corroborate prior research demonstrating that automated scheduling systems save administrators time and improve academic operations through optimized scheduling approaches [3], while also ensuring greater flexibility and accuracy in assigning courses, classes, and faculty [4].

The study was limited to the information technology department; therefore, the findings may not fully represent the scheduling complexities of other academic units. Future research should expand system implementation across departments, incorporate heuristic optimization techniques, develop student-facing modules, and conduct long-term performance assessments with larger user populations. The system demonstrates that automated scheduling is a viable solution for academic institutions, achieving satisfaction and efficiency rates that compare favourably with those of intelligent scheduling systems documented in prior research [10]. Furthermore, its modular design incorporates principles that facilitate adaptation to other departments [9].

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REFERENCES

[1]. Abubakar, S., Dauda, M. K., Abdullahi Musa, M., & Muhammad, B. M. (2026). Design and implementation of a web-based lecture timetable scheduling system. Journal of Informatics and Web Engineering, 5(1), 252–266. https://doi.org/10.33093/jiwe.2026.5.1.16

[2]. Austero, L. D., Medina, R. P., & Matias, J. B., Sison A. M. (2022). Optimizing faculty workloads and room utilization using heuristically enhanced WOA. International Journal of Advanced Computer Science and Applications, 13(9). https://thesai.org/Downloads/Volume13No11/Paper_64-Optimizing_Faculty_Workloads_and_Room_Utilization.pdf

[3]. Diallo, F. P., & Tudose, C. (2024). Optimizing the scheduling of teaching activities in a faculty. Applied Sciences, *14*(20), Article 9554. https://doi.org/10.3390/app14209554

[4]. International Organization for Standardization [ISO]. (2011). ISO/IEC 25010:2011 Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models. ISO. https://www.iso.org/standard/35733.html

[5]. K. B. Shibu K., Malavika S., Minnu S., P. Lakshmi P., and Sandra Elizabeth J. (2025), "A Novel Slot Filling Algorithm for Automated Time Table Generation of Academic Institutions," in 2025 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation (IATMSI), Thiruvanathapuram, India, 2025. https://ieeexplore.ieee.org/document/11077271

[6]. Lund, A. (2001). Measuring usability with the USE questionnaire. Usability and User Experience Newsletter of the STC Usability SIG. https://garyperlman.com/quest/quest.cgi?form=USE

[7]. Moghimi, B., Dastouri, M., & Zanjirchi, M. S. (2025). Designing an optimal scheduling framework for balancing lecturer workload and student timetables in large academic institutions: A case study of Ankara Medipol University, Türkiye. Journal of Information Systems Engineering and Management, 10(2). https://doi.org/10.52783/jisem.v10i39s.7188

[8]. Richey, R. C. (1994). Developmental research: The definition and scope. Paper presented at the Proceedings of Selected Research and Development Presentations at the 1994 National Convention of the Association for Educational Communications and Technology, Nashville, TN, United States. https://files.eric.ed.gov/fulltext/ED373753.pdf

[9]. Silva, G. A. da. (2026). Bipartite modelling for solving the university timetable problem. Proceedings of the SBMAC. https://proceedings.sbmac.org.br/sbmac/article/view/5218/5277

[10]. Yan, J., Li, M., Ma, X., & Wang, J. (2024). Scheduling constraints and implementation in teaching management systems incorporating association rule mining algorithms. *International Journal of Knowledge-Based Development, 14*(3), 229–248. https://inderscience.com/info/inarticle.php?artid=141628

